MAXAUTO
SHENZHEN ARADEX DRIVE TECHNOLOGIES CO.,LTD
Add: 5th Floor,No.B Building,HuaFeng industrial Zone,
Hangcheng Street,Baoan District,Shenzhen City,China
http: //www.aradexdrive.com

HD500 Drive User Manual

MAXAUTO

MAXAUTO

User manual

HD500 AC Drive

Preface

Thank you for purchasing the HD500 series AC drive developed by Our company.

HD500 series AC drive is a general-purpose high-performance vector control AC drive, and it is mainly used used for controlling and regulating the speed of the three-phase AC asynchronous motor. It is a new generation of AC Drive with latest technology. HD500 series is characterized in the high-performance V/F control and Vector control 0 Algorithm technology, high torque output at low frequency and strong overload capacity. It possess good stability, dynamic performance, communication bus functions, rich powerful and stable performance, with perfect anti-tripping control and the ability to adapt to bad power grid. It is used to drive various automatic production equipments involving the industry of textile, papermaking, wire drawing, machine tools, packaging, food, fans and pumps and so on.

HD500 Series AC drive Features

Advanced Vector Control Algorithm.

✦ Vector control 0 Algorithm with low speed stability, high torque output at low frequency and dynamic performance.

✦ smaller, compact volume.

✦ In the full power range, the same power type compared to the old series products, it reduces the volume of 20%~40%. As the volume is reduced, the optimized thermal design ensures the favorable temperature rise of the whole AC drive.

Stronger functions:

✦ 485 Communication, built-in high precision PID, multi-stage speed and simple PIC, swing frequency, length and counting value functions.

The optimized VF control and sensorless vector control is more stable at low speed, more powerful in the ability of low frequency torque output and with better dynamic response and both the sensorless vector and sensor vector mode support speed control and torque control.

Unpacking Inspection Cautions

Every AC Drive have been tested strictly in factory prior to shipment. Upon unpacking, check:

✦ Whether the product is damaged;

✦ Whether the nameplate of model and AC drive ratings are consistent with your order.

✦ Whether the box contains the AC drive, certificate of conformity, user manual and warranty card. If you find any omission or damage, contact Our company or your supplier immediately.

First-time Use

For the users who use this product for the first time, read the manual carefully. If in doubt concerning some functions or performances, contact the technical support personnel of Our company to ensure correct use.

HD500 series AC drives have passed CE test and also meet the require-ments of following International Standard.

✦ IEC/EN 61800-5-1:2003 Safety requirements for adjustable speed electric drive systems.

✦ IEC/EN 61800-3:2004 adjustable speed electric drive systems:(The third par)the electromagnetic compatibility standard of the product and its specific test method.

✦ IEC/EN 61000-2-1,2-2,3-2,3-3,4-2,4-3,4-4,4-5,4-6:EMC International and EU Standards.

✦ The instructions are subject to change, without notice, due to product upgrade, specification modification as well as efforts to increase the accuracy and convenience of the manual.

Contents

Chapter 1

Safety and Cautions

1.1 Safety and Cautions Definition

Read this manual carefully so that you have a thorough understanding. Installation, commissioning or maintenance may be performed in conjunction with this chapter. Our company will assume no ability and responsibility for any injury or loss caused by improper operation.

Danger

Operations which are not performed comply with the requirements may cause severe hurt or even death.

Note

Operations which are not performed comply with requirements may cause personal injury or property damage.

1.2 Safety Cautions

Use Stage	Safety Grade	Precautions
Before Installation	Danger	✦ Do not install the equipment if you find water seepage, component missing or damage upon unpacking. ✦ Do not install the equipment if the packing list does not conform to the product you received.
	Danger	✦ Handle the equipment with care during transportation to prevent damage to the equipment. ✦ Do not use the equipment if any component is damaged or missing. Failure to comply will result in personal injury. ✦ Do not touch the components with your hands. Failure to comply will result in static electricity damage.
During Installation	Danger	✦ Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failures to comply may result in a fire. ✦ Do not loosen the fixed screws of the components, especially the screws withe red marks.
	Note	✦ Do not drop wire end or screw into the AC drive. Failure it will result in damage to the AC drive. ✦ Install the AC drive in places free of vibration and direct sunlight. ✦ When two AC drives are laid in the same cabinet ,arrange the installation positions properly to ensure the cooling effect.
At wiring	Danger	✦ A circuit breaker must be used to isolate the power supply and the AC drive. Failure to comply may result a fire. ✦ Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock. ✦ Never connect the power cables to the output terminals(U,V,W) of the AC drive. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply may result in damage to the AC drive. ✦ Ensure that the main cable line comply with the standard, the line meets the EMC requirements and the area safety standard. Failure to comply may result in risk or accident. ✦ Never connect the power cables the braking resistor between the DC bus terminals P+, P-. Failure to comply may result in a fire.

Use Stage	Safety Grade	Precautions
At wiring	Danger	✦ Use a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded.
Before Power-on	Danger	✦ Please confirm the peripheral equipment and cable converter is configured in this manual of the recommended model, all the configuration line in accordance with the connection method of the manual provides the correct wiring. Failure to comply will result in accidents. ✦ Check that the voltage class of the power supply is consistent with the rated voltage class of the AC drive.
After Power-on	Danger	✦ Do not open the AC drive's cover after power-on. Failure to comply may result in electric shock. ✦ Do not touch the operation of AC drive during the hands is wet. Failure to comply will result in accident. ✦ Do not touch any I/O terminal of the AC drive. Failure to comply may result in electric shock. ✦ Do not change the default settings of the AC drive. Failure to comply will result in damage to the AC drive. ✦ Do not touch the rotating part of the motor during the motor auto-tuning or running. Failure to comply will result in accident.
During Operation	Danger	✦ Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the AC drive. ✦ Do not touch the fan or the discharging resistor to check the temperature. Failure to comply will result in personal burnt.
	Danger	✦ Avoid objects falling into the AC drive when it is running. Failure to comply will result in damage to the AC drive. ✦ Do not start or stop the AC drive by turning the contactor ON/OFF. Failure to comply will result in damage to the AC drive.
After Power-on	Danger	✦ Do not repair or maintain the AC drive at power-on. Failure to comply will result in electric shock. ✦ Ensure that the AC drive is disconnected from all power suppliers before staring repair or maintenance on the AC drive. ✦ Repair or maintenance of the AC drive may be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the AC drive.

Use Stage	Safety Grade	Precautions
After Power-on	Danger	✦ Set and check the parameters again after the AC drive is replaced.

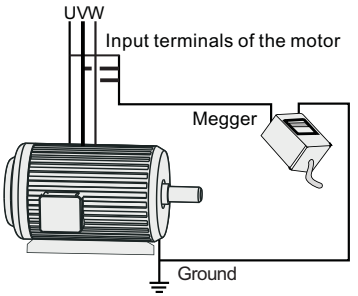
1.3 Cautions

1.3.1 Requirement on Residual Current Device(RCD)

The AC drive generates high leakage current during running, which flows earthing (PE) conductor. Thus install a type-B RCD at the transient and steady-state leakage current to ground that may be generated at startup and during running of the AC drive. You can select a specialized RCD with the function of suppressing high harmonics or general-purpose RCD with relatively large residual current.

1.3.2 Motor Insulation Test

Perform the insulation test when the motor is used for the first time, or when it is reused after being stored for a long time, or in a regular check-up, in order to prevent the poor insulation of motor windings from damaging the AC drive during the insulation test. A 500-V mega-Ohm meter is recommended for the test. The insulation resistance must not be less than 5 MΩ.



1.3.3 Thermal Protection of Motort

If the selected AC drive does not match the rated capacity of the motor , especially when the rated power of the AC drive is higher than that of the motor, adjust the parameters for motor protection in the AC drive or to install thermal relay to protect the motor .

1.3.4 Running Below and Above Rated Frequency

The AC drive provides frequency output of 0 to 600.00Hz. When the users use the frequency converter for a long time, please pay attention to the motor cooling or use of variable frequency motor. If the AC drive is required to run at over 50Hz, consider the capacity of the machine.

1.3.5 Vibration of mechanical device

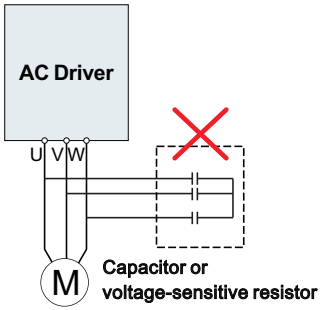
The AC drive may encounter the mechanical resonance point at some output frequencies, which can be avoided by setting the skip frequency. If the operating frequency of the customer coincide with the resonant frequency please modify the operating frequency or change the inherent resonance frequency of the mechanical system.

1.3.6 Motor heat and noise

The output of the AC drive is pulse width modulation (PWM) wave with certain harmonic frequencies, and therefore, the motor temperature, noise, and vibration are slightly greater than those when the AC drive runs at power frequency (50 Hz).

1.3.7 Voltage-sensitive device or capacitor on output side of the AC drive

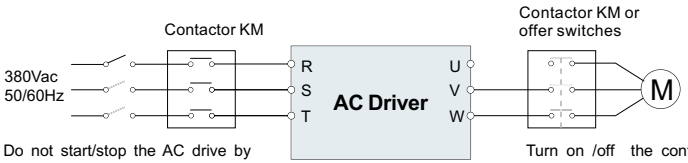
Do not install the capacitor for improving power factor or lightning protection voltagesensitive resistor on the output side of the AC drive because the output of the AC drive is PWM wave. Otherwise, the AC drive may suffer transient overcurrent or even bedamaged.



1.3.8 Contactor at the I/O terminal of the AC drive

When a contactor is installed between the input side of the AC drive and the power supply, the AC drive must not be started or stopped by switching the contactor on or off. If the AC drive has to be operated by the contactor, ensure that the time interval between switching is at least one hour since frequent charge and discharge will shorten the service life of the capacitor inside the AC drive.

When a contactor is installed between the output side of the AC drive and the motor,do not turn off the contactor when the AC drive is active. Otherwise, modules inside the AC drive may be damaged.



Do not start/stop the AC drive by switching the contactor on/off. If the AC drive has to be operated by the contactor, ensure that the tiome interval is at least one hour.

Turn on /off the contactor when the AC drive has no output. Otherwise,modifies inside the AC drive may be damaged.

1.3.9 The Use Occasion of the External Voltage Out of Rated Voltage Rage

The AC drive must not be used outside the allowable voltage range specified in this manual. Otherwise, the AC drive's components may be damaged. If required, use a corresponding voltage step[-up or step-down device.

1.3.10 The Above Derating of the Default

Different power grade frequency converter has its default carrier frequency, when to run at a higher carrier frequency, the AC Drive must to reduce the amount when running.

1.3.11 Change Three Phase Input into Two Phase Input

It is not allowed to change the three phase AC drive into two phase one . Otherwise , it may cause it may cause fault or damage the AC drive.

1.3.12 The Protection of the Lighting Impulse

Although the AC drive has equipped with lightning overvoltage, overcurrent device, which has a certain protection function for the induction lightining. For the lightning prone areas, the user is necessary to install lightning protection device at the front of the AC drive, which will benefit to the service life of the transducer.

1.3.13 Ambient Temperature and De-rating

The normal use of the frequency converter ambient temperature is -10℃~40℃. Temperature exceeds 40℃, the equipment need to reduce the amount of use. The ambient temperature of each increase is reduced by 1.5%, the maximum use of the ambient temperature is 50℃.

1.3.14 Altitude and Derating

In places where the altitude is above 1000m and the cooling effect reduces due to thin airit is necessary to de-rate the AC drive. Contact Our company for technical support.

1.3.15 Some Special Usages

If writing that is not described in this manual, such as common DC bus is applied, contact the agent or Our company for technical support.

1.3.16 The Cautious of the AC drive Disposal

The electrolytic capacitors on the main circuits and PCB may explore when they are burnt. Poisonous gas is generated when the plastic parts are burn. Treat them as ordinary industrial refer to relevant national laws and regulations.

1.3.17 Adaptable Motor

1. The standard parameters of the adaptable motor is adaptable four-squirrel-cage asynchronous induction motor or PMSM. For other types of motor, select a proper AC drive according to the rated motor current.

2. The cooling fan and rotor shaft of general AC Drive are coaxial, which results in reduced cooling effect when the rotational speed declines. If variable speed is required, add a more powerful fan or replace.

3. The standard parameters of the adaptable motor have been configured inside the AC drive. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions. Otherwise, the running result and protection performance will be affected.

4. The AC drive may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the AC drive is disconnected from the tested parts.

Chapter 2

Product Information

2.1 Chapter of This Content

This chapter briefly introduces the operation principle, product features, layout, namepl-ate, and type of instruction.

2.2 Basic Principle

HD500 is a kind of AC drive used to control asynchronous AC induction motor.

The following figure shows the AC drive main circuit diagram. Rectifie make three-phase AC voltage into DC voltage. Capacitor groups of intermediate circuit stabilize the DC voltage .The AC drive converts of the DC voltage to AC voltage for AC motor use. When the voltage in the circuit exceeds the maximum limit, the braking pipe will connect an external braking resistor to the intermediate DC circuit to consume the feedback energy.

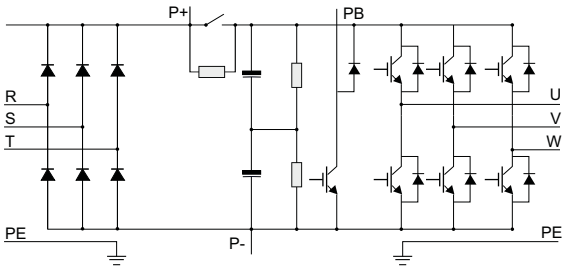


Figure 2-1 Main Circuit Diagram(less than 18.5 kw (including))

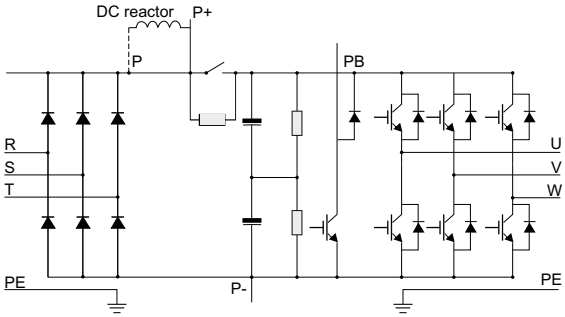


Figure 2-2 Main Circuit Diagram (22kw~30kw)

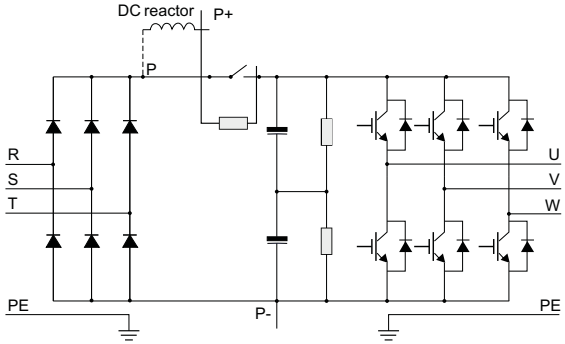


Figure 2-3 Main Circuit Diagram (over 30kw)

Note:

1. Higher than 22kw AC drive (including) support for external DC reactor, before connecting, it need to take down the bronze between P and P +. 1.
2. Lower than 30kw AC drive (including) support for external braking resistor, higher than 37kw AC drive (including) support for external braking unit , braking resistor.

2.3 Naming Rules

In the model code contains the product information Users can find the code from the transducerand simple nameplate.

HD500 - 4T 11 G/ 15 P C

① ② ③ ④ ③ ④ ⑤

Field	Mark	Explanation	Content
Ac drive series	①	Ac drive series	HD500
Voltage Level	②	Voltage Level	2S:single-phase 220V 2T:Three-phase 220V 4T:Three-phase 380V
Adaptive Power	③	Adaptive Power	0.7KW~500KW
Function Type	④	Function Type	G:General P:Fan pump
braking Unit	⑤	braking Unit	Null:None C:Only braking unit

Figure 2-4 Name Designation Rules

2.4 Nameplate

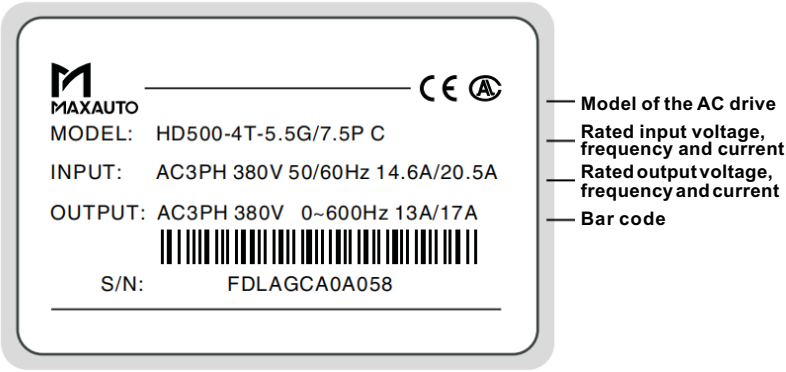


Figure 2-4 Name Designation Rules

2.5 HD500 Series of AC drive

Model	Power Capacity (KVA)	Input Current (A)	Output Current (A)	Adaptable Motor (KW)
single-phase 220V Range:-15%~20%				
HD500-2S-0.7G	1.5	8.2	4.7	0.75
HD500-2S-1.5G	3.0	14.0	7.5	1.5
HD500-2S-2.2G	4.0	23.0	10.0	2.2
Three-phase 220V Range:-15%~20%				
HD500-2T-0.7G	1.5	5.5	4.7	0.75
HD500-2T-1.5G	3.0	7.7	7.5	1.5
HD500-2T-2.2G	4.0	12.0	10.0	2.2
Three-phase 380V Range:-15%~20%				
HD500-4T-0.7G	1.5	3.4	2.3	0.75
HD500-4T-1.5G	3.0	5.0	3.7	1.5
HD500-4T-2.2G	4.0	5.8	5.1	2.2
HD500-4T-4.0G	5.9	10.5	8.5	4.0
HD500-4T-5.5G	8.9	14.6	13	5.5
HD500-4T-7.5G	11	20.5	17	7.5
HD500-4T-11G	17	26.0	25	11
HD500-4T-15G	21	35.0	32	15
HD500-4T-18.5G	24	38.5	37	18.5
HD500-4T-22G	30	46.5	45	22
HD500-4T-30G	40	62.5	60	30
HD500-4T-37G	57	76.0	75	37
HD500-4T-45G	69	92.0	91	45
HD500-4T-55G	85	113	112	55
HD500-4T-75G	114	157	150	75
HD500-4T-90G	134	180	176	90
HD500-4T-110G	160	214	210	110
HD500-4T-132G	192	256	253	132
HD500-4T-160G	231	307	304	160
HD500-4T-185G	255	333	330	185
HD500-4T-200G	287	380	377	200
HD500-4T-220G	311	429	426	220
HD500-4T-250G	355	470	465	250
HD500-4T-280G	396	525	520	280
HD500-4T-315G	439	605	600	315

Model	Power Capacity (KVA)	Input Current (A)	Output Current (A)	Adaptable Motor (KW)
HD500-4T-350G	479	665	660	350
HD500-4T-400G	530	730	725	400
HD500-4T-450G	600	825	820	450
HD500-4T-500G	660	910	900	500

Note:

1. 0.75 ~ 315 kw AC drive input current is the measured results, which under the condition of input voltage 380V, and without DC reactor as well as input and output reactor;
2. 350 ~ 500 kw AC drive input current is the measured results, which under the condition of input voltage 380V, and equipped with input reactor;
3. Rated output current is defined as the output current of the output voltage 380V.

2.6 Technical Specifications

Item		Specification			
Basic Function	Maximum frequency	0~600Hz			
	Carrier frequency	1.0kHz~16.0kHz; The carrier frequency is automatically adjusted based on the load features.			
	Input frequency resolution	Digital setting : 0.01Hz Analog setting : Maximum frequency x 0.025%			
	Control mode	0:V/F control 1:Vector control 0 mode			
	Speed range	1:50 (vector control 0 mode) 1HZ/150% Rated troque			
	Overload capacity	G type : 150% rated current for 60s		P type: 110% rated current for 60s	
	Torque boost	Auto torque boost		Manual torque boost: 0.1%~20.0%	
	V/F curve	Line	Multi-point	Square V/F curve	VF separation
	Accelerate/ Decelerate curve	Line or S-curve Acc/Dec mode, four kinds of Acc/Dec time Range of Acc/Dec time 0.0~6000.0s			
	DC braking	DC braking frequency : 0.00Hz to Maximum frequency braking time: 0.0 to 100.0s braking current : 0.0 to 150%			
	Jog control	Jog frequency range : 0.00Hz~F00.03Maximum frequency			
	Simple PLC Multi-speed	16-speed operating through built-in PLC or control terminal			
	Onboard PID	It realizes process-controlled closed loop control system easily.			
	Auto voltage regulation (AVR)	Jog frequency range : 0.00Hz~Maximum frequency			
	Overvoltage/overcurrent stall control	The current and voltage are limited automatically during the running process so as to avoid frequent tripping due to overvoltage/overcurrent.			
	Rapid current limit	It helps to avoid frequent over- current faults of the AC drive.			

Item		Specification
Freatures	Non stop function	Load feedback energy compensates the voltage reduction so that the AC drive can continue to run in a short time in case of power interruption.
	Speed tracking start	Identify the speed of rapidly rotating motor to realize a smooth start without any rush.
	Rapid current limit	Rapid software and hardware current limiting technology helps to avoid frequent over-current fault.
	Virtual IO	Four sets of virtual DO, five groups of virtual DI, enables easy logic control.
	Timing Control	Timing control: set the time range 0.0Min~6500.0Min
	Multi-motor switch	Two independent motor parameters enable two motors switching control
	Bus Support	Two independent Modbus communication, profibus-DP
Running	Motor overheating protection	Optional IO expansion card 1, analog input AI5 acceptable the input of motor temperature sensor .(PT100,PT1000)
	Command source	Given the control panel, control terminal, serial communication port given. It can be switched by a variety of ways.
	Frequency source	11 frequency sources: digital setting, analog voltage setting, analog current setting, pulse setting and serial port. It can be switched by a variety of ways.
	Auxiliary frequency source	11 auxiliary frequency source. Flexible implementation of auxiliary frequency tuning, frequency synthesis.
	Input terminal	Standard: . Six digital input terminals, one of which support to 50kHz high-speed pulse input . Three analog input terminals, two of which supports -10V~10V voltage input . One support 0 ~ 10V voltage input or 0 ~ 20mA current input Expansion capability: . Two digital inputs . One analog input terminal, support 0-10.00V（0-20mA） input, and supports PT100 / Pt1000
	Output terminal	Standard: . One high-speed pulse output terminal (optional open collector type), support of 0 ~ 50kHz square wave signal output . One digital output terminal . Two relay output terminals . Two analog output terminals, support 0~20mA current output or 0~10V voltage output
Display and operation	LED display	Display each parameter of function code group
	The key lock and function selection	Achieve some or all of the keys locked and define the scope of partial keys to prevent misuse.
	Protection function	Powered motor short circuit test; Input/output phase failure protection; Over current protection; voltage protection; Under voltage protection; Over heat protection ; Overload protection; braking resistor fault protection.
	Protection function	
	Accessories	Brake unit, Simple IO expansion card, Multi-functional IO expansion card

Item		Specification
Environment	Application environment	In-door, free from direct sunlight, dust, corrosive gas, combustible ga , oil mist, steam , water drop and salt .
	Altitude	Lower than 1000m (1000m-3000m for derated use)
	Ambient temperature	-10℃+40℃ (derated use in the ambient temperature of 40℃ to 50 ℃)
	Humidity	Less than 95%RH, without condensation
	Vibration	Less than 5.9m/s(0.6g)
	Storage temperature	-20℃~+60℃

2.7 Structure diagram

2.7.1 The following figure shows the layout of the AC drive (7.5KW,for example).

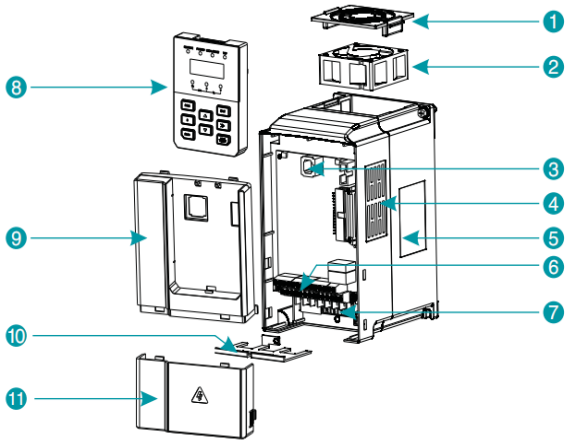


Figure 2-6 Product structure diagram

No	Name	Description
1	Fan-cover	Protection fan.
2	Cooling fan	Refer to 8.1 " Definition of Related Terms."
3	Keypad interface	It is used to connect the Keypad.
4	Vents-cover	Optional. with the vents-cover installed, the protection level will increase and the AC drive internal temperature will increase as well so please derating use the AC drive.
5	Nameplate	Refer to 2.4 "Nameplate"
6	Control terminals	Refer to 3.3 "Standard Wiring."
7	Main circuit terminals	Refer to 3.3 "Standard Wiring."
8	Keypad	Refer to chapter4 "Operation, Display and Application Examples."
9	Cabinet-cover	Protect the internal components.
10	Apron	Convenient input and output wiring.
11	Lower-cover	Protect the internal components.

2.7.2 Product Outline, Installation Hole Size

2.7.2. HD500 series less than7.5KW (including 7.5KW)

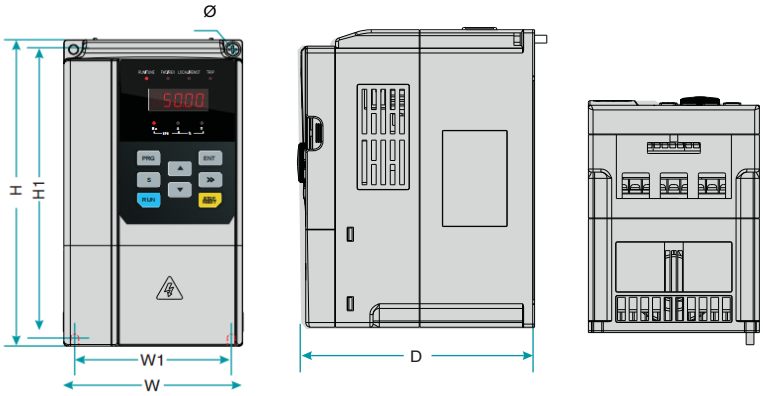


Figure 2-7 Less than 7.5 KW AC drive installation dimensions and installation size

AC drive model	H(mm)	W(mm)	D(mm)	H1(mm)	W1(mm)	Diameter (mm)	GW(kg)
HD500-2S-0.7G	190	110	150	178	98	Ø5	2.4
HD500-2S-1.5G							
HD500-2S-2.2G							
HD500-2T-0.7G	190	110	150	178	98	Ø5	2.4
HD500-2T-1.5G							
HD500-2T-2.2G							
HD500-4T-0.7G	190	110	150	178	98	Ø5	2.4
HD500-4T-1.5G							
HD500-4T-2.2G							
HD500-4T-4.0G	210	130	160	198	118	Ø5	3.5
HD500-4T-5.5G	250	155	176	236	141	Ø5	4.5
HD500-4T-7.5G							

2.7.2. HD500 Series 11KW~45KW

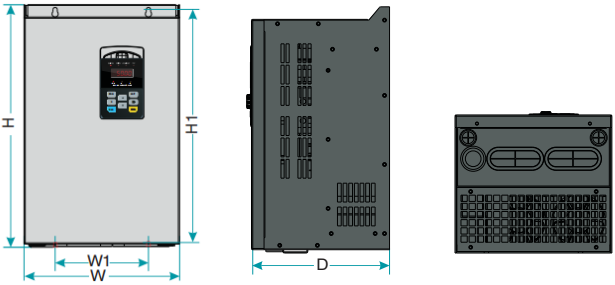


Figure 2-8 11kw~45kw AC drive installation dimensions and installation size

AC drive model	H(mm)	W(mm)	D(mm)	H1(mm)	W1(mm)	Diameter (mm)	GW(kg)
HD500-4T-11G	285	170	162	270	135	Ø6	5.1
HD500-4T-15G	332	220	214	318	140	Ø7	9.3
HD500-4T-18.5G							
HD500-4T-22G	387	250	220	373	150		14
HD500-4T-30G							19
HD500-4T-37G	440	270	252	426	180		25
HD500-4T-45G							

2.7.2.3 HD500 Series 55KW~110KW

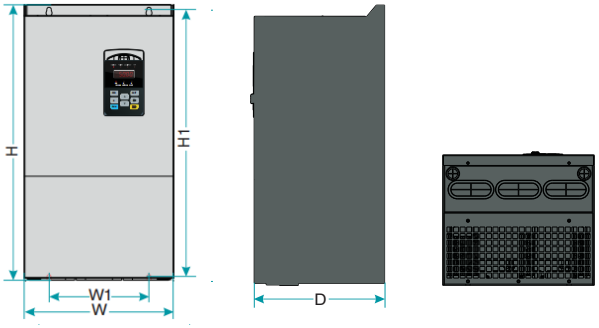


Fig 2-9 55~110KW AC drive installation dimensions and installation size

AC drive model	H(mm)	W(mm)	D(mm)	H1(mm)	W1(mm)	Diameter (mm)	GW(kg)
HD500-4T-55G	550	300	258	534	200	Ø9	32
HD500-4T-75G	650	370	282	625	250		52
HD500-4T-90G							55
HD500-4T-110G							58

2.7.2. HD500 Series 132KW~185KW

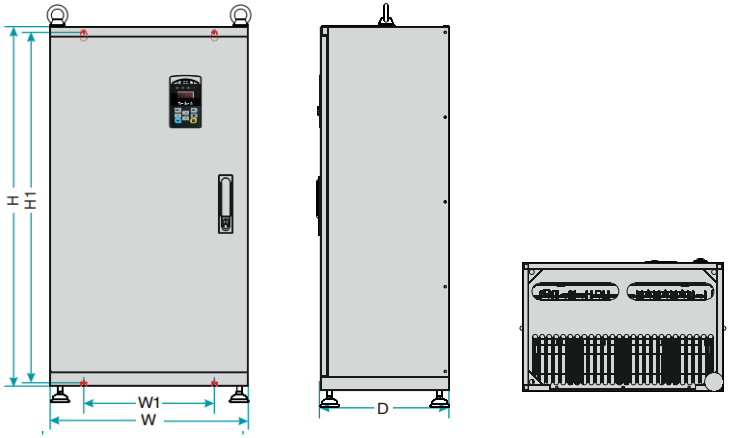


Figure 2-10 132KW~185KW AC drive installation dimensions and installation size

AC drive model	H(mm)	W(mm)	D(mm)	H1(mm)	W1(mm)	Diameter (mm)	GW(kg)
HD500-4T-132G	880	485	310	860	320	Ø13	99
HD500-4T-160G							
HD500-4T-185G							

2.7.2.5 HD500 Series 200KW~500KW

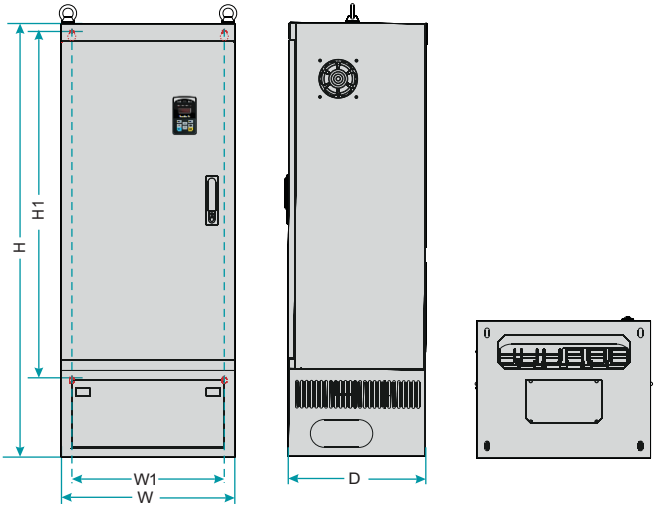


Figure 2-11 200KW~500KW AC drive installation dimensions and installation size

AC drive model	H(mm)	W(mm)	D(mm)	H1(mm)	W1(mm)	Diameter (mm)	GW(kg)
HD500-4T-200G	1250	500	400	1000	440	Ø13	167
HD500-4T-220G							
HD500-4T-250G							
HD500-4T-280G	1350	650	400	1105	513	Ø13	206
HD500-4T-315G							
HD500-4T-350G							
HD500-4T-400G	1810	850	405	1410	513	Ø13	415
HD500-4T-450G							
HD500-4T-500G							

2.7.3 External Keypad Installation Dimensions

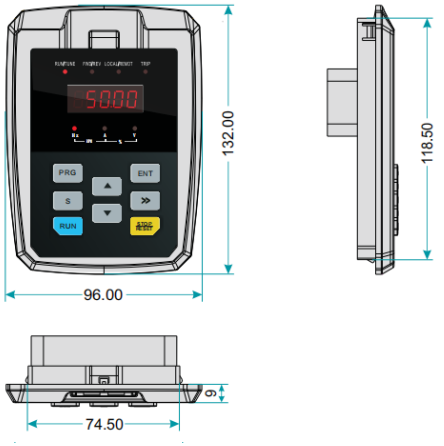


Figure 2-12 Keypad Installation dimensions

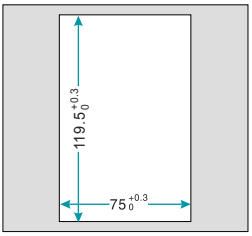


Figure 2-13
Opening dimension diagram
for keypad with base

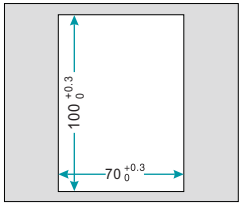


Figure 2-14
Opening dimension diagram
for keypad without base

2.8 Peripheral Electrical Components System Structure

When using HD500 series AC drive to control asynchronous motor system, you have to install various electrical components on the side of input and output of the AC drive to guarantee the stability and safety of system.In addition, HD500 series AC drive is equipped with a variety of optional accessories and expansion card to achieve various functions. More than 37kw series three-phase 380v system structure as shown in the figure below(The figure AC drive terminal refer to 55~110KW):

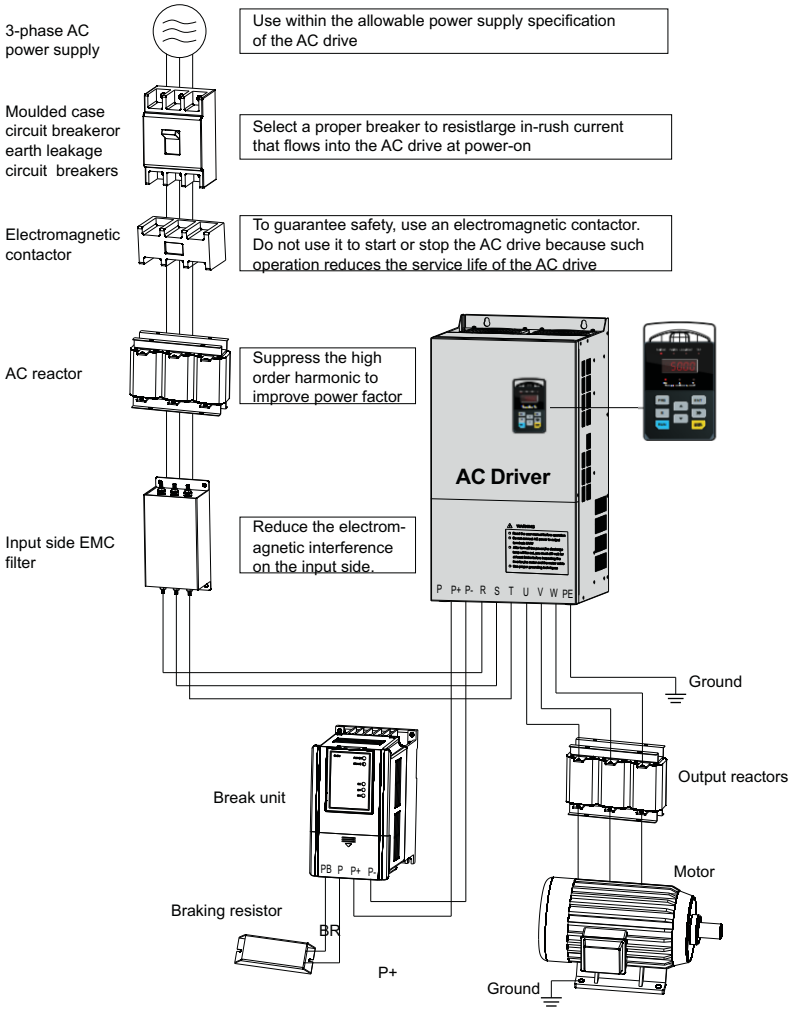


Figure 2-15 Under 37 kw series 3-phase 380 V system structure diagram

2.8.1 Peripheral Electrical Components Description

Accessory Name	Installation position	Function Description
MCCB	Power receiving side	✦ Interrupt the power supply when overcurrent occurs on downstream devices.
Contactor	Between MCCB and the AC drive input side	✦ Start and stop the AC drive.Do not start and stop the AC drive frequently by switching the contactor on and off (less than twice per minute) nor use it to directly start the AC drive.
AC input reactor	AC drive input side	✦ Improve the power factor of the input side; ✦ Eliminate the higher harmonics of the input side effecti-vely and prevent other devices from being damaged due ✦ to distortion of the voltage waveform; ✦ Eliminate the input current unbalance due to unbalance between the power phases;
EMC input filter	AC drive input side	✦ Reduce the external conduction and radiation interfere- ✦ nce of the AC drive; ✦ Decrease the conduction interference flowing from the ✦ power end to the AC drive and improve the anti-interfe- ✦ rence capacity of the AC drive.
DC reactor	HD500 series AC drive of 200G and above configured with DC reactor as standard	✦ Improve the input power factor; ✦ Improve the efficiency and thermal stability of the AC drive; ✦ Eliminate the impact of higher harmonics of the AC drive input side and reduce the external conduction and radiation interference.
AC output reactor	Between the AC drive output side and the motor, close to the AC drive	✦ The output side of the AC drive generally has much higher harmonics. When the motor is far from the AC drive, there is much distributed capacitance in the circuit and certain harmonics may cause resonance in the circuit, bringing about the following two impacts: ✦ a.Degrade the motor insulation performance and damage the motor in the long run. ✦ b.Generate large leakage current and cause frequent AC drive protection trips. ✦ If the distance between the AC drive and the motor is greater than 100 m, install an AC output reactor.

Note:

1. Do not install capacitor or surge suppressor on the output side of the AC drive. Otherwise, it may cause faults to the AC drive or damage to the capacitor and surge suppressor;

2. Input/output (main circuit) of the AC drive include harmonic components, which may interfere with the AC drive attachment communications equipment. Therefore, install an anti-aliasing filter to minimize the interference;

3. Details of peripherals and options refer to Chapter 2 selection of peripheral devices.

2.8.2 Peripheral electrical components selection guidance

AC Drive model	MCCB(A)	Recommended contactor	Recommended input side main circuit wire mm2	Recommended output side main circuit wire mm2	Recommended control loop wire mm2
Single phase 220V					
HD500-2S-0.7G	16	10	2.5	2.5	1.0
HD500-2S-1.5G	20	16	4.0	2.5	1.0
HD500-2S-2.2G	32	20	6.0	4.0	1.0
Three phase 220V					
HD500-2T-0.7G	16	10	2.5	2.5	1.0
HD500-2T-1.5G	25	16	4.0	2.5	1.0
HD500-2T-2.2G	25	16	4.0	4.0	1.0
Three phase 380V					
HD500-4T-0.7G	10	6	2.5	2.5	1.0
HD500-4T-1.5G	16	10	2.5	2.5	1.0
HD500-4T-2.2G	16	10	2.5	2.5	1.0
HD500-4T-4.0G	25	16	4.0	4.0	1.0
HD500-4T-5.5G	32	25	4.0	4.0	1.0
HD500-4T-7.5G	40	30	4.0	6.0	1.0
HD500-4T-11G	63	40	4.0	6.0	1.0
HD500-4T-15G	63	40	6.0	10	1.0
HD500-4T-18.5G	100	63	6	10	1.5
HD500-4T-22G	100	63	10	10	1.5
HD500-4T-30G	125	100	16	16	1.5
HD500-4T-37G	160	100	16	25	1.5
HD500-4T-45G	200	125	25	25	1.5
HD500-4T-55G	250	160	50	35	1.5
HD500-4T-75G	210	160	60	50	1.5

AC Drive model	MCCB(A)	Recommended contactor	Recommended input side main circuit wire mm2	Recommended output side main circuit wire mm2	Recommended control loop wire mm2
HD500-4T-90G	250	160	70	50	1.5
HD500-4T-110G	350	350	120	120	1.5
HD500-4T-132G	400	400	150	150	1.5
HD500-4T-160G	500	400	185	185	1.5
HD500-4T-185G	600	400	185	185	1.5
HD500-4T-200G	600	600	150*2	150*2	1.5
HD500-4T-220G	600	600	150*2	150*2	1.5
HD500-4T-250G	800	600	185*2	185*2	1.5
HD500-4T-280G	800	800	185*2	185*2	1.5
HD500-4T-315G	1000	800	150*3	150*3	1.5
HD500-4T-350G	1000	800	150*4	150*4	1.5
HD500-4T-400G	1200	1000	150*4	150*4	1.5
HD500-4T-450G	1200	1000	150*4	150*4	1.5
HD500-4T-500G	1600	1000	150*4	150*4	1.5

2.9 HD500 Optional Parts

Peripheral optional braking unit, each function expansion card and the outer lead operator, etc..As shown below. Seeing detailed usage instructions for use of the accessory. For the following options, please note when ordering.

Name	Type	Function	Remark
Internal braking unit	Models followed by letter "C"	Models power under 22KW are installed with the internal braking unit as standard configuration	For 30KW model power, the braking unit is optional
External braking unit	SDBUN	37KW and above need to be configured with an external braking unit	Multiple braking ones are connected in parallel for the models above 90KW
Multi-function I/O expansion card	SDIO	Increase 3 digital inputs, 2 digital outputs, two relay outputs, two analog voltage input T_Motor	It applies to all models
Modbus communication card	SDRS485	One RS - 485 communication card, one CAN communication card.	It applies to all models
	SDCAN		
Profibus-DP card	SDDP	Profibus-DP card , DB9interface	It applies to all models

2.9.1 Selection Braking Unit

The section recommend braking assembly is instructional data, user can select different resistance value and power according to actual situation. (Resistance values can not be lower than the recommended ones , the power can be higher than recommended ones). Braking rem inertia, deceleration time, energy of potential energy load. Customs select the AC drive should comply esistance can be selected according to the power of motor in actual applied system. They are also related to systwith the actual situation. The bigger of the system inertia, the shorter of the deceleration time, the more frequent of the braking, and the braking resistence should select larger power and smaller resistance .

2.9.1.1 The Selection of Resistance Value

When braking, almost all renewable energy consumption of the motor is on the braking resistor,According to the formula :

- U*U/R=Pb
- U------ Braking voltage at stable braking system.
  (System selections differs in braking voltages, The AC380Vsystem usually selects DC700V braking voltage.)
- Pb-----Braking power

2.9.1.2 The Selection of braking Resistor Power

Theoretically braking resistance of power and braking power is consistent, but considering the derating 70%.

According to the formula :

$$0.7*Pr=Pb*D$$

- Pr------ Resistor power
- D------- Braking frequency (The reproduction process accounts for the proportion of the entire working process)

  Elevator---20%~30% Open and draw volume---20%~30%
  Centrifuge---50%~60% Accidental braking load---5%
  Commonly take 10%

2.9.1.3 Selection of Reference

When the AC drive is driven by the control device requiring rapid braking, the braking unit needs to release the power of the motor braking feedback to the DC bus. 400V voltage level 0.4 ~30kw is equipped with built-in braking unit, if you need to rapid stop, please refer to the appropriate braking to select the unit and braking resistance, AC drive capacity, if need to stop, it can be directly connected to the braking resistance. Please choose the appropriate braking unit according to the braking resistance of the AC drive capacity.

AC drive Capacity (kw)	Braking Unit		Braking Resistor		
	Specification	Quantity	Resistance	Power	Quantity
0.4	Built-in as standard	1	≥300Ω	150W	1
0.75		1	≥300Ω	150W	1
1.5		1	≥220Ω	150W	1
2.2		1	≥200Ω	250W	1
4.0		1	≥130Ω	300W	1
5.5		1	≥90Ω	400W	1
7.5		1	≥65Ω	500W	1
11		1	≥40Ω	800W	1
15		1	≥32Ω	1000W	1
18.5		1	≥25Ω	1300W	1
22		1	≥22Ω	1500W	1
30	Built-in Optional	1	≥16Ω	2500W	1
37		1	≥16Ω	3700W	1
45		1	≥16Ω	4500W	1
55		1	≥8Ω	5500W	1
75	EHBU70	2	≥8Ω	3700W	2
90		2	≥8Ω	4500W	2
110		2	≥8Ω	5500W	2
132		3	≥8Ω	3700W	3
160		3	≥8Ω	5500W	3
185		4	≥8Ω	4500W	4
200		4	≥8Ω	5500W	4
220		4	≥8Ω	5500W	4

2.10 Connection Methods

2.10.1 Braking Resistor Connection

HD500 series under 30KW(30KW included) AC drive braking resistor connection as shown in figure 2-16.

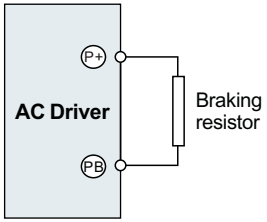


Figure 2-16 braking resistor connection

2.10.2 Braking Unit Connection

HD500 series AC drive and the braking unit connection as shown in figure 2 -17.

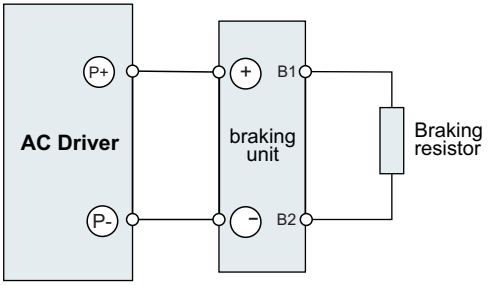


Figure 2-17 braking unit connection

2.10.3 Braking ones in Parallel Connection

When a single braking unit failing to meet the needs of the braking energy, two or more braking ones are required in parallel connection, as shown in figure 2-18.

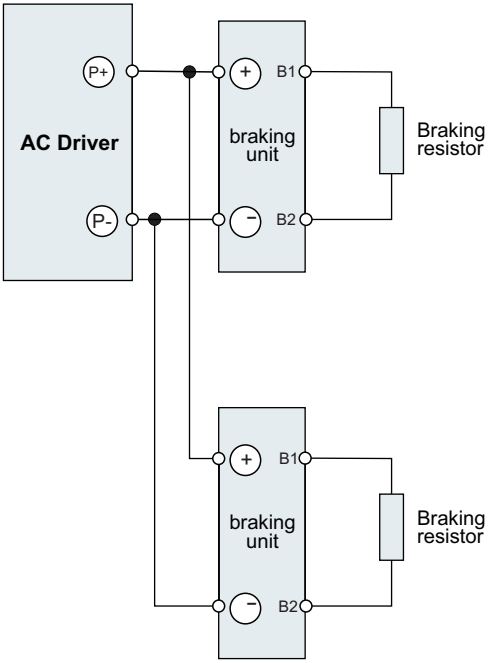


Figure 2-18 braking ones in parallel connection

Chapter 3

Mechanical and Electrical Installation

3.1 Chapter of This Content

This chapter introduce the mechanical and electrical installation of the AC drive.

Danger

- Only those who are trained and qualified professionals can operate the work described in this chapter. Please operate according to the section of "pay attention to security matters", failure to these may cause personal injury or damage to equipment.
- Power supply of AC drive must be disconnected before the installation. If the AC drive has connected to power, please power off first and then wait not less than the time marked on the AC drive and confirm the Charge Lamp was already off, users in such condition are advised to use the multimeter to measure if the DC bus voltage of the AC drive is under 36v.
- The installation and design of the AC drive must comply with relevant laws and regulations of the installation region. If the installation of the AC drive violates the requirements of local laws and regulations, We Our company does not assume any legal responsibility. In addition, if user are not comply with the recommendations, the AC drive may appear some faults not covered by the warranty.

3.2 Mechanical Installation

3.2.1 Installation Environment

In order to make full use of the performance of the AC drive and maintain its function for a long time, it is very important to install the environment. Please install the AC drive in the following table of the described environment.

Environment	Conditions
Installation site	Indoor
Ambient temperature	✦ -10~+50℃ ✦ If the ambient temperature of the AC drive is above 40℃, derate 3% for every additional 1℃. ✦ It is not recommended to use the AC drive if the ambient temperature is above 50℃. ✦ In order to improve the reliability of the device, do not use the inverter if the ambient temperature changes frequently. ✦ Please provide cooling fan or air conditioner to control the internal ambient temperature below the required one if the AC drive is used in a close space such as in the control cabinet. ✦ When the temperature is too low, if the AC drive needs to restart to run after a long stop, it is necessary to provide an external heating device to increase the internal temperature, otherwise damage to the devices may occur.
Humidity	✦ Rh≤90% ✦ No condensation is allowed, The maximum relative humidity should be equal to or less than 60% in corrosive air.
Storage temperature	-30~+60℃
Running Environment Condition	✦ The installation site of the AC drive should: ✦ keep away from the electromagnetic radiation source ; ✦ keep away from contaminative air, such as corrosive gas, oil mist and flammable gas; ✦ ensure foreign objects,such as metal power,dust,oil,water can not enter into the AC drive(do not install the AC drive on the flammable materials such as wood) ✦ keep away from direct sunlight,oil mist,steam and vibration environment;
Altitude	<1000m,If the sea level is above 100m,please derate 1% for every additional 100m.
Vibration	≤5.8m//s²(0.6g)
Installation direction	AC drive should be installed on an upright position to ensure sufficient cooling effect.

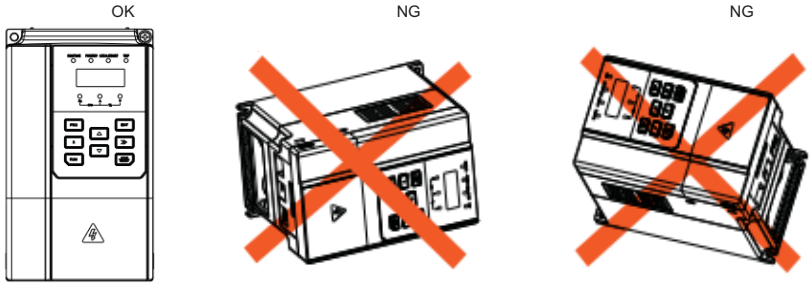
Note:

1. HD500 series AC drive should be installed in a clean and ventilated environment according to enclosure classification.
2. Cooling air must be clean,free from corrosive materials and electrically conductive dust.

3.2.2 Installation Direction

The AC drive may be installed on the wall or in a cabinet.

The AC drive must be installed in an upright position. Check the installation site according to the requirements below.Refer to chapter 3.1 outline diagram for frame details.



A. Vertical installation B. Alinic installation C. Transverse installation

Figure 3-1 Installation direction of AC drive

3.2.3 Installation Manner

Wall mounting(for the AC drive of 380V≤315KW)

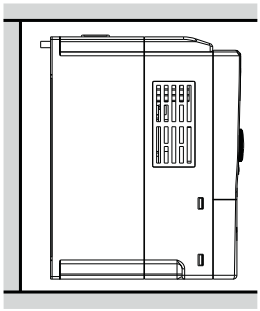


Figure3-2 Installation manner

1. Mark the hole location. The location of the holes is shown in the outline diagram in 3.2 charpter;
2. Fix the screws or bolts to the marked locations;
3. Put the AC drive against the wall;
4. Tighten the screws in the wall securely.

3.2.4 Single Installation

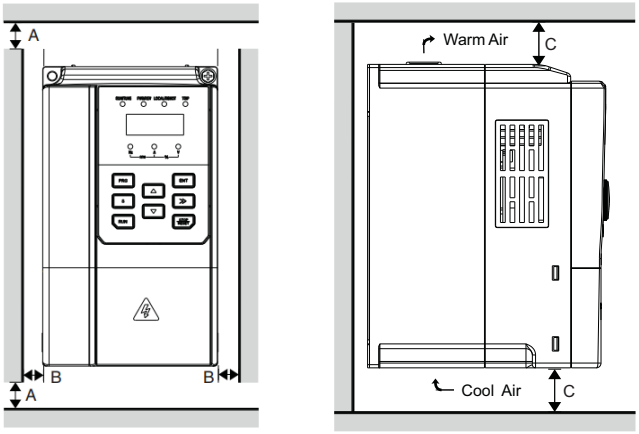


Figure 3-3 Single installation

Note:

B min. 5MM; C: 30KW below min. 200MM, 37KW above min. 300MM.

3.2.5 Multiple Installation

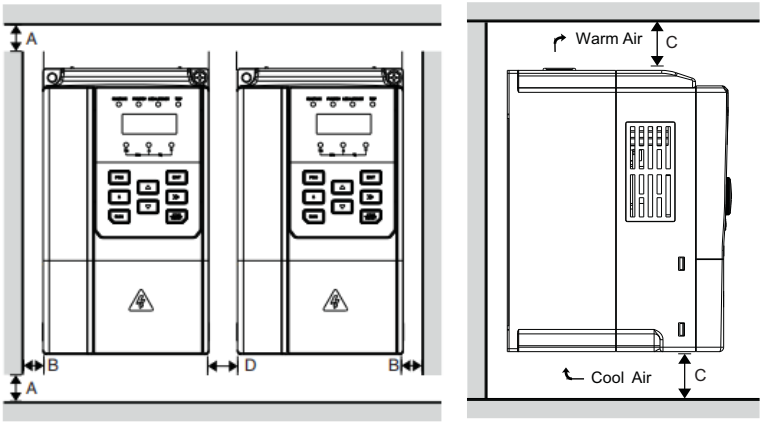


Figure 3-4 Parallel installation

Note:

1. When installing ac drives with different sizes, align the upper positions of each ac drives before installing them. This is easy to maintain on later stage.
2. B, D min. size is 5MM; C: 30kw below min. 200MM, 37KW above mini. 300MM

3.2.6 Vertical Installation

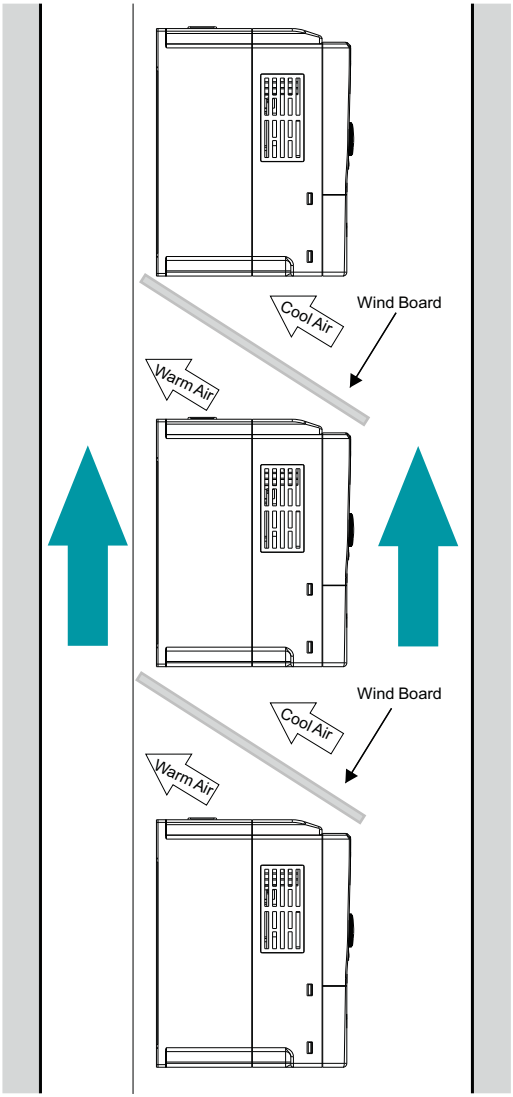


Figure 3-5 Vertical installation

Note:

Windscreen should be installed in vertical installation for avoiding mutual impact and insufficient cooling.

3.2.7 Canted Installation

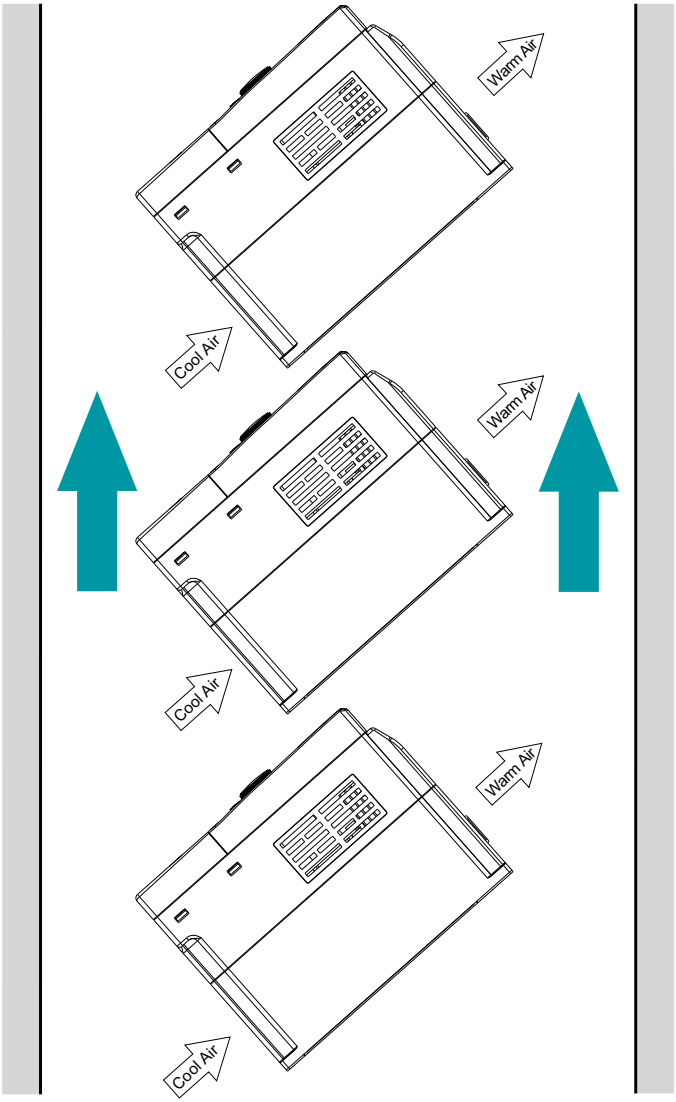


Figure 3-6 Tilt installation

Note:

Ensure the seperation of the wind input and output channels in tilt installation for avoiding mutual impact..

3.3 Standard Wiring

3.3.1 Main Circuit Wiring Diagram

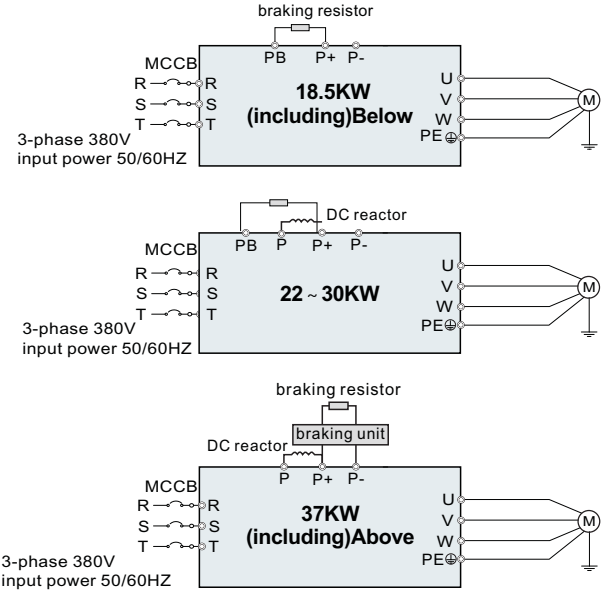


Figure 3-7 Main circuit wiring diagram

Note:

1. DC reactor, braking unit and braking resistor are optional accessories".

2. P1 and(+) are short circuited in factory, if need to connect with the DC reactor, please remove the contact tag between P1 and (+).

3.3.2 Main Circuit Terminals Diagram

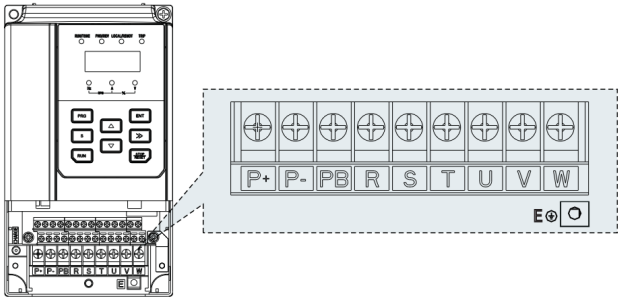


Figure 3-8 7.5KW below main circuit terminal diagram

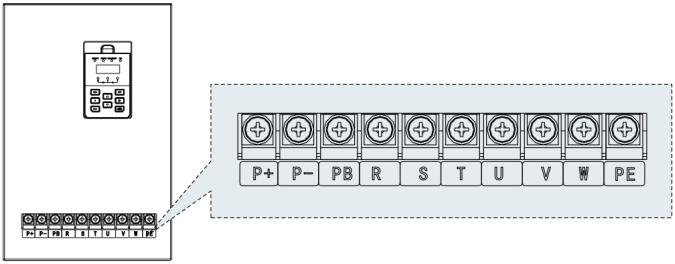


Figure 3-9 11~18.5kw main circuit terminal diagram

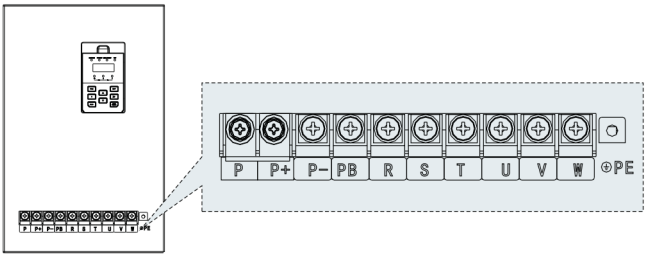


Figure 3-10 22kw main circuit terminal diagram

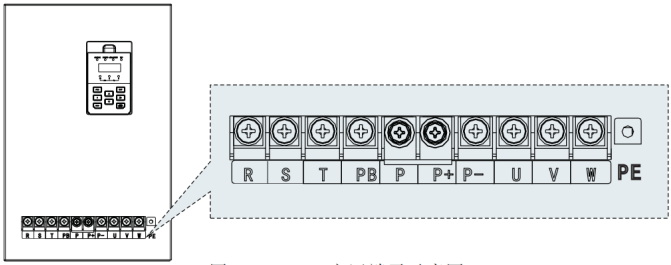


Figure 3-11 30kw main circuit terminal diagram

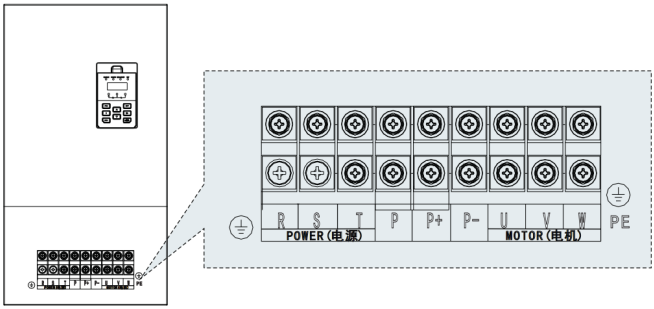


Figure 3-12 37~45kw main circuit terminal diagram

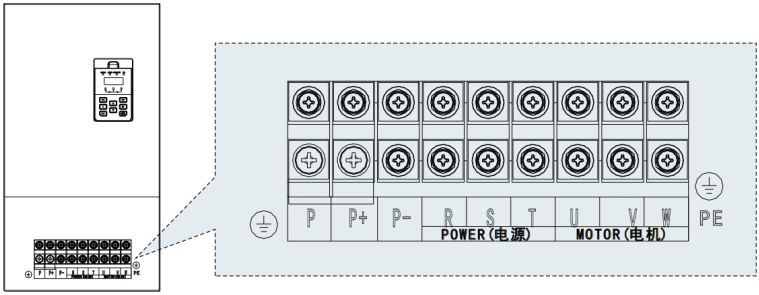


Figure 3-13 55~110kw main circuit terminal diagram

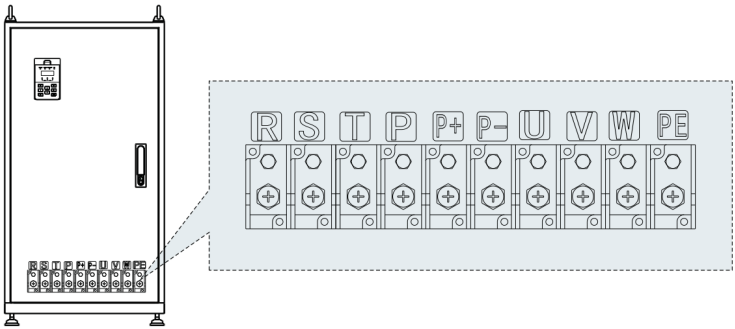


Figure 3-14 380V 132~185kw main circuit terminal diagram

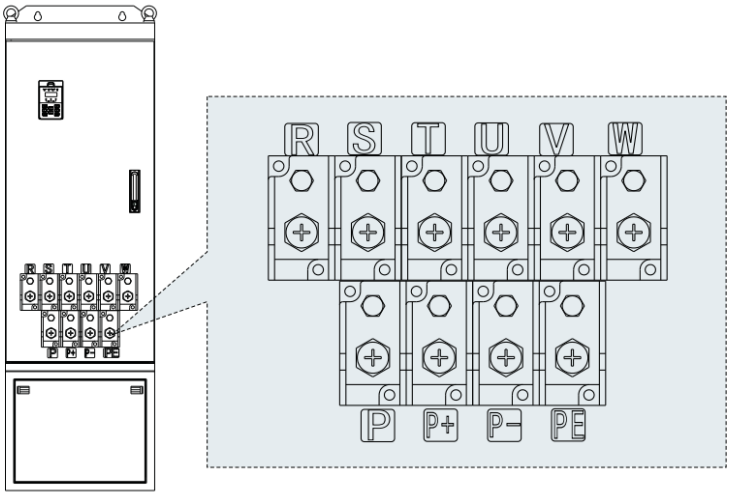


Figure 3-15 380V 200~500kw main circuit terminal diagram

Terminal	Terminal Name			Function Description
	18.5KW (including) below	22~33KW	37KW (including) above	
R、S、T	Power input of the main circuit			3-phase AC input terminals which are generally connected with the power supply.
U、V、W	AC drive output			Three-phase AC output terminals, general connected to the motor.
P	Without the terminal	DC reactor terminal	DC reactor terminal	P、P1 and (+) are connected with the terminals of DC reactor. P(+) and P(-) are connected with the terminals of braking unit. PB and P(+) are connected with the terminals of braking resistor.
P+	Braking resistor terminal	DC reactor terminal braking resistor terminal	DC reactor terminal braking unit terminal	
P-	/	/	Braking unit terminal	
PB	Braking resistor terminal	Braking resistor terminal	Without the terminal	
PE	400V:Grounding resistance is less than 10Ω			Protective grounding terminals, every machine is provided 2 PE terminals as the standard configuration.These terminals should be grounded with proper techniques.

Note:

1. Do not use an asymmetrically constructed motor cable. If there is a sysmmetically constructed grounding conductor in the motor cable in addition to the conductive shield,connect the grounding conductor to the grounding terminal at the AC drive and motor ends;

2. Braking resistor, braking unit and DC reactor are optional parts;

3. Route the motor cable,input power cable and control cables seperately;

4. If the terminal description is"/",the machine does not provide the terminal as the external terminal.

3.3.3 Main Circuit Terminal Wiring Process

1. Fasten the grounding conductor of the input power cable with the grounding terminal of the AC drive(PE)by 360 degree grounding technique. Connect the phase conductors to R, S, and T terminals and fasten;

2. Strip the motor cable and connect the shield to the grounding terminal of the AC drive by 360 degree grounding technique. Connect the phase conductors to U, V and W terminals and fasten;

3. Connect the optional brake resistor with a shielded cable to the designated position by the same procedures in the previous step;

4. Secure the cables outside the AC drive mechanically.

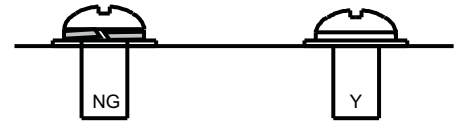


Figure 3-15 Screw installation diagram

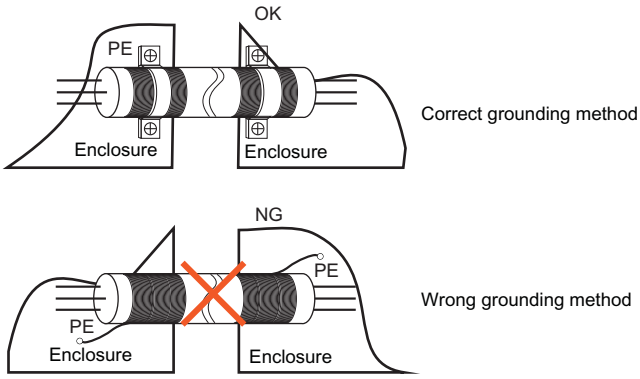


Figure 3-16 360-degree grounding technique diagram

3.3.4 Control Circuit Wiring Diagram

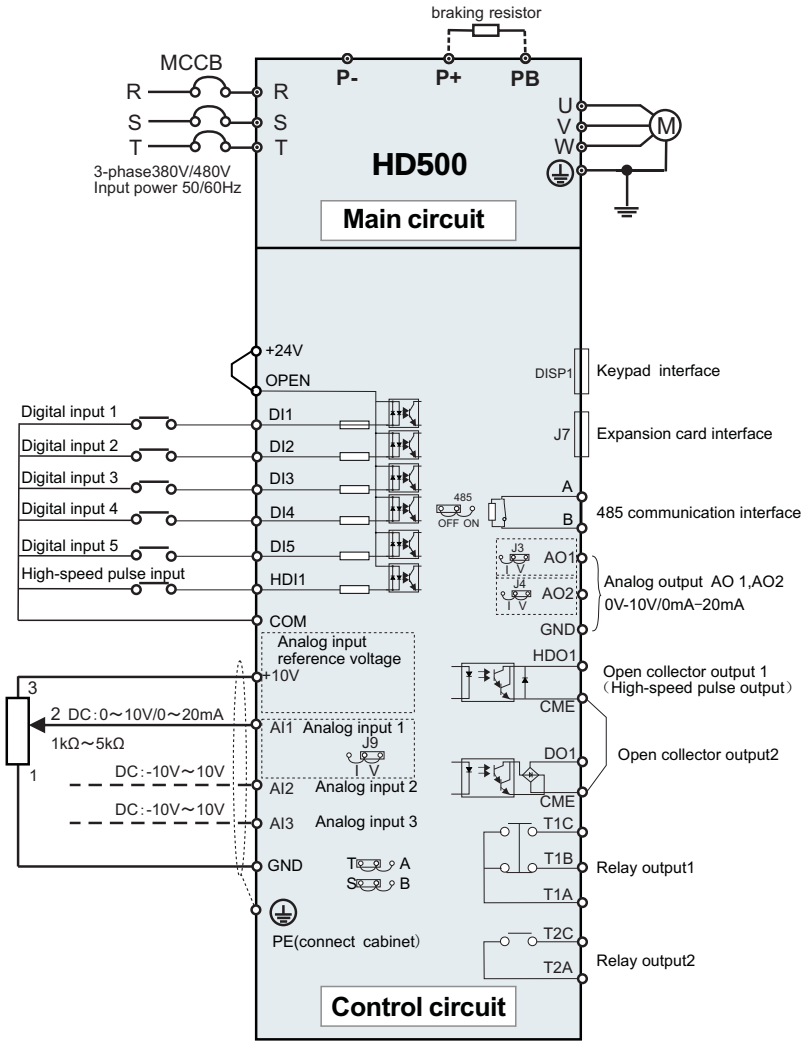


Figure 3-17 Wiring diagram of Control Circuit

Note:

This diagram is only suitable for the AC drive's power rate below HD500-4T-18.5,for other power rate refer to this chapter 3.3"Main Circuit Terminal Wiring".

3.3.5 Control Panel Terminals

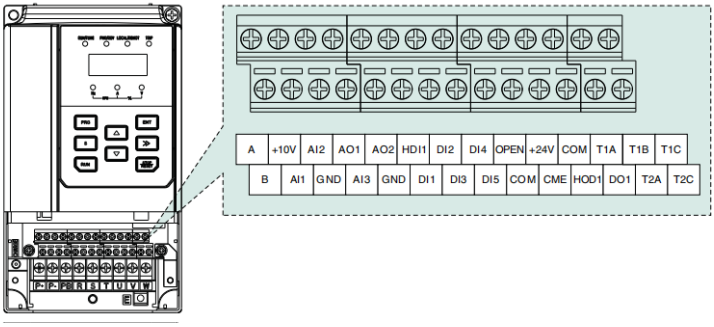


Figure 3-18 Control terminal diagram

Control Panel Terminal Function Instructions

Type	Terminal	Terminal name	Specification
Analog input	+10V	Analog input reference voltage	10.5V(+3%)
			Maximum output current 25mA/ the potentiometer resistance range is more than 4KΩ.
	GND	Analog ground	Internal isolated with COM
	AI1	Analog Input 1	0~20mA：Input resistance 500Ω, max input current is 25mA
			0~10V：Input resistance 100KΩ, max input voltage 12.5V
			Input range: 0–10VDC/0–20 mA, switched by jumper J9 on the control board and factory defaulted as voltage input.
	AI2	Analog Input 2	-10V~10V：Input resistance 25KΩ
			Max. input voltage range:-12.5V~+12.5V
	AI3	Analog Input 3	-10V~10V: Input resistance 25KΩ
			Max input voltage range: -12.5V~+12.5V
Digital output	AO1	Analog output 1	0~20mA:Input resistance 200Ω~500Ω
			0~10V：Input resistance >10KΩ
			Input range: 0–10 VDC/4–20 mA, switched by jumper J3 on the control board and factory defaulted as voltage input.
	AO2	Analog output 2	0~20mA:Input resistance 200Ω~500Ω
			0~10V：Input resistance >10KΩ
			Input range: 0–10 VDC/4–20 mA, switched by jumper J4 on the control board and factory defaulted as voltage input.
	GND	Analog ground	Internal isolated with COM
	+24V	+24V	24V±10%，Internal isolated with GND
	OPEN	Digital input terminal common	Switch the high and low electric level during digital input, it was connected with + 24 V short circuit in factory which means it's effective when the digital input is with low level.

Control Panel Terminal Function Instructions(continued)

Type	Terminal	Terminal name	Specification
Digital input	COM	+24V	Internal isolated with GND
	DI1~DI5	Digital input 1-5	Input specification：24VDC，5mA
			Frequency range：0~200Hz
			Voltage range：10V~30V
	HDI1	High-speed pulse input / digital input 6	Voltage Pulse input：Maximum frequency 50KHz
			Voltage range：10~30V
			Digital input: equal with DI1~DI5
Digital output	DO1	Open collector output	Voltage range：0~24V
			Current range：0~50mA
	HDO1	High-speed pulse output	Pulse output:：0~50KHz
	CME	DO1/HDO1 Digital output public ground	0~20mA: Input impedance: 500Ω, Max input current: 25mA
			CME and COM is internal isolated, but the factory has an external short circuit (DOI default is + 24V drive). when DO1 driven with an external power supply, it must be disconnected the external shorting of CME and COM.
Relay output	T1A、T1B、T1C	Relay 1 output	T1A-T1B:NC T1A-T1C:NO
			Contact capacity：250VAC/5A，30VDC/5A
	T2A、T2C	Relay 2 output	T2A-T2C:NO
			Contact capacity：250VAC/3A，30VDC/3A
Rs485 commun-ication	A	485 differential signal +	Speed rate：1200/2400/4800/9600/19200/38400
	B	485 differential signal -	Use twisted pair or shielded cable, the longest distance:300m
	GND	Analog ground	Internal isolated with COM

Switching Dial Code Switch Function Description

Name	Jumpers Figure	Function	Factory setting
485		Rs485 communication terminating resistor selection ON: 120Ω termination resistor connection is valid OFF: Without termination resistor connection	OFF
AI1		I is the current input (0~20mA) V is voltage input (0~10V)	0 ~ 10V
AO1		I is current output (0~20mA) V is voltage output (0~10V)	0 ~ 10V

Switching Dial Code Switch Function Description(continued)

Name	Jumpers Figure	Function	Factory setting
AO2		I is current output (0~20mA) V is voltage output (0~10V)	0~10V
T/A,S/B		Speed tracking / closed-loop encoder input function selection T and S group: speed tacking option A and B group: closed-loop encoder impulse selection	Note: only allow appear the following combination:T and S, or A and B 
J14,J15		Choose whether connect PE with GND/COM. Occcasions with interference, Connect PE with GND/COM can improve the ablility to resist the interference.	When no connection(Jumper is on the right side of the control board when you face to the control board)

Note:

For the selection of the jumper of T/A , S/B, when you choose the speed tracking start function, please set the combination of T and S.

3.3.6 Input/output signal connection diagram

3.3.6.1 AI Analog input terminal

Weak analog voltage signals are easy to suffer external interference, and therefore the shielded cable must be used and the cable length must be less than 20 m, as shown in following figure3-19.In applications where the analog signal suffers severe interference, install filter capacitor or ferrite magnetic core at the analog signal source, as shown in the following figure 3-20.

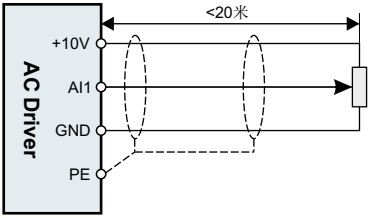


Fig3-19 Analog input and output terminal wiring diagram

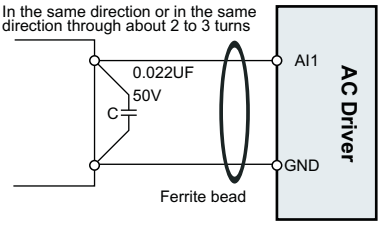


Figure 3-20 Analog input terminal process wiring diagram

3.3.6.2 DI Digital Input Terminals

Generally, select shielded cable no longer than 20 m. When active driving is adopted,necessary filtering measures shall be taken to prevent the interference to the power supply.
It is recommended to use the contact control mode.

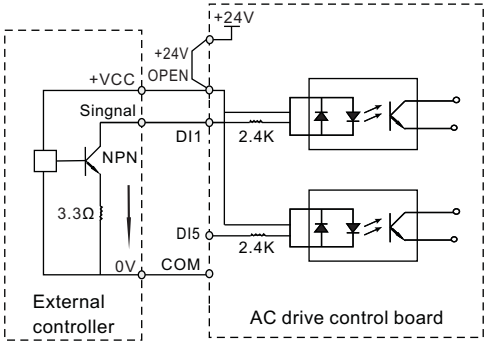


Figure 3-21 Sink wiring

This is the most commonly used wiring mode. To apply external power supply, remove jumpers between +24 V and OPEN and connect the 24V positive pole of external power supply to OPEN and connect the external power 0V to the corresponding DI terminal via control the contact control.

Note

- In this In such wiring mode, the DI terminals of different AC drives cannot be connected in parallel. Otherwise, DI mal-function may result. If parallel connection (different AC drives) is required, connect a diode in series at the DI and the diode needs to satisfy the requirement: IF>10mA, UF <1 V.As shown in Figure 3-22.

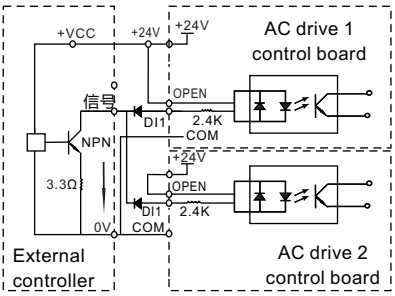


Figure 3-22 DI terminals connected in parallel in SINK mode

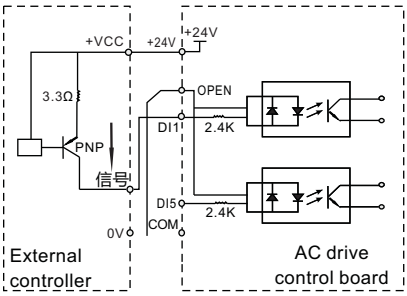


Figure 3-23 Source Wiring

In such wiring mode, remove the jumper between +24 V and OP. Connect +24 V to the common port of external controller and meanwhile connect OP to COM. If external power supply is applied, remove the jumper between +24V and OPEN,.and connect the OPEN with the 0V of the external power supply, the external power +24V need to be connected to the corresponding DI terminal on its way passing the contact control of external controller.

3.3.6.3 DO Digital Output Terminal

When the digital output terminal needs to drive the relay, an absorption diode shall be installed between two sides of the relay coil. Otherwise, it may cause damage to the 24 VDC power supply. The driving capacity is not more than 50 mA.

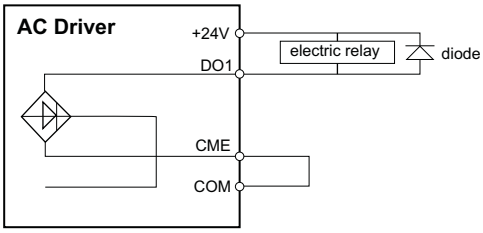


Figure 3-24 DO Terminal Wiring diagram

Note

- Do not reverse the polarity of the absorption diode during installation. Otherwise, the 24V DC power supply will be damaged immediately once there is digital output.
- When the product leaving factory, digital output CME and COM are external short connect (Do1 is the default +24V drive). When the DO driven by external power, remove the exter- nal connection between CME and COM short connection.

3.4 Layout Protection

3.4.1 Protect the AC drive and input power cable in short-circuit situations

Protect the AC drive and input power cable in short circuit situations and against thermal overload. Arrange the protection according to the following guidelines.

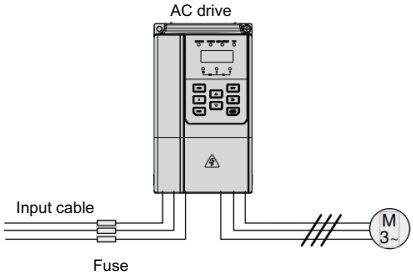


Figure 3-25 Fuse configuration diagram

Note:

Select the fuse as the manual indicated.The fuse will protect the input power cable from damage in short-circuit situations. It will protect the surrounding devices when the internal of the AC drive is short circuited.

3.4.2 Protecting the motor and motor cable in short-circuit situations.

The AC drive protects the motor and motor cable in a short-circuit situation when the motor cable is dimensioned according to the rated current of the AC drive. No additional protection devices are needed.

⚠Note

- If the AC drive is connected to multiple motors, a seperate thermal overload switch or a circuit breaker must be used for protecting each cable and motor. These devices may require a seperate fuse to cut off the short-circuit current.

3.4.3 Protecting the motor against thermal overload

According to regulations, the motor must be protected against thermal overload and the current must be switched off when overload is detected. The AC drive includes a motor thermal protection function that protects the motor and closes the output to switch off the current when necessary.

3.4.4 Implementing a bypass connection

It is necessary to set power frequency and variable frequency conversion circuits for the assurance of continious normal work of the AC drive if faults occur in some significant situations.In some special situations, for example, if it is only used in soft start, the AC drive can be conversed into power frequency running after starting and some corresponding bypass should be added.

⚠Note

- Never connect the supply power to the AC drive output terminals U,V,W.Power line voltage applied to the output can result in permanent damage to the AC drive.

If frequent shifting is required, employ mechanically connected switches or contactors to ensure that the motor terminals are not connected to the AC power line and inverter output terminals simultaneously.

Chapter 4

Operation, Display and Application Examples

4.1 Chapter of This Content

This chapter contains following operation:

Buttons, indicating lights and the screen as well as the methods to inspect, modify and set function codes by keypad.

4.2 Introduction of the keypad

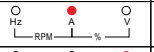
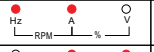
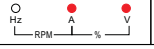
The keypad is used to control HD500 series AC drive, read the state data and adjust par -ameters.

Figure 4-1 Keypad diagram

Note:

It is necessary to use M3 screw or installation bracket to fix the external keypad. The installation bracket for AC drive of 7.5KW is optional but it is standard for the AC drive of below 11KW.

No.	Name	Instructions	
1	Status indicator	RUN/TUNE	LED off means that the AC drive is in the stopping state; LED blinking means the AC drive is in the parameter autotuning state; LED on means the AC drive is in the running state.
		FWD/REV	OFF means the AC drive is in the forward rotation state ON means the AC drive is in the reverse rotation state.
		LOCAL/REMOT	○ LOCAL/REMOT : OFF — Operation panel control
			● LOCAL/REMOT : PN — Terminal control
			◔ LOCAL/REMOT : Flash — Communication control
		TRIP	LED for faults LED on when the AC drive is in the fault state; LED off in normal state LED blinking means the AC drive is in the pre-alarm state.

<table>
<tr><th>No.</th><th>Name</th><th colspan="3">Instructions</th></tr>
<tr><td>2</td><td>Unit indicator</td><td colspan="3">It represents the current display of the Keypad
<table>
<tr><td>  </td><td>Hz</td><td>Frequency unit</td></tr>
<tr><td>  </td><td>A</td><td>Current unit</td></tr>
<tr><td>  </td><td>V</td><td>Voltage unit</td></tr>
<tr><td>  </td><td>RPM</td><td>Speed unit</td></tr>
<tr><td>  </td><td>%</td><td>Percentage</td></tr>
</table></td></tr>
<tr><td>3</td><td>Code Display Zone</td><td colspan="3">5-figure LED display displays various monitoring data and alarm code such as set frequency and output frequency.
<table>
<tr><th>Display letter</th><th>Corresponding letter</th><th>Display letter</th><th>Corresponding letter</th><th>Display letter</th><th>Corresponding letter</th></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>2</td><td>2</td></tr>
<tr><td>3</td><td>3</td><td>4</td><td>4</td><td>5</td><td>5</td></tr>
<tr><td>6</td><td>6</td><td>7</td><td>7</td><td>8</td><td>8</td></tr>
<tr><td>9</td><td>9</td><td>A</td><td>A</td><td>b</td><td>b</td></tr>
<tr><td>C</td><td>C</td><td>d</td><td>d</td><td>E</td><td>E</td></tr>
<tr><td>F</td><td>F</td><td>H</td><td>H</td><td>I</td><td>I</td></tr>
<tr><td>L</td><td>L</td><td>n</td><td>N</td><td>n</td><td>n</td></tr>
<tr><td>o</td><td>o</td><td>P</td><td>P</td><td>r</td><td>r</td></tr>
<tr><td>S</td><td>S</td><td>t</td><td>t</td><td>U</td><td>U</td></tr>
<tr><td>v</td><td>v</td><td>.</td><td>.</td><td>-</td><td>-</td></tr>
</table></td></tr>
<tr><td>4</td><td>Digital potentiometer</td><td colspan="3">When the frequency source A or B is set to 1, the setting of the frequency source is determined by the analog potentiometer input voltage . The maximum output voltage corresponding to the maximum frequency, minimum voltage corresponding to 0 Hz</td></tr>
<tr><td>5</td><td>Keypad button zone</td><td colspan="3"><table>
<tr><td>  </td><td>Program key</td><td>Enter or escape from the first level menu and remove the parameter quickly</td></tr>
<tr><td>  </td><td>Entry key</td><td>Enter the menu step-by-step confirm parameters</td></tr>
<tr><td>  </td><td>Up key</td><td>Increase data or function code progressively</td></tr>
<tr><td>  </td><td>Down key</td><td>Decrease data or function code progressively</td></tr>
<tr><td>  </td><td>Right-Shift key</td><td>Move right to select the displaying parameter circularly in stopping and running mode. Select the parameter modifying digit during the parameter modification</td></tr>
</table></td></tr>
</table>

No.	Name	Instructions		
5	Keypad button zone	RUN	Run key	The key is used to operate on the AC drive in key operation mode
		STOP RESET	Stop/Reset	This key is used to stop in running state; This key is used to reset all control modes in the fault alarm state..
		S	S Key	F07.01=0 without function F07.01=1 jog running F07.01=2 shift key to change the display state F07.01=3 switch between forward and reverse F07.01=4 clear UP/DOWN setting F07.01=5 coast to stop F07.01=6

4.3 Display of Keypad

HD500 series Keypad display statussis divided into stopping state parameter, running state parameter, function code parameter editing state and fault alarm state and so on.

4

4.3.1 Displayed state of stopping parameter

When the AC drive is in the stopping state, the keypad will display stopping parameters. In the stopping state,various kinds of parameters can be displayed. Select the parameters to be displayed or not by F07.04.See the instructions of F07.04 for the detailed definition of each bit.

In the stopping state, there are 14 stopping parameters can be selected to be displayed or not. They are: set frequency, bus voltage, input terminals state, output terminals state, PID given value, PID feedback value, torque set value,AI1,AI2,AI3,HDI,PLC and the current stage of multi-step speeds, pulse counting value, length value.F07.04can select the parameter to be displayed or not by bit and press > > button can shift the parameters from left to right, press butoon "S" (F07.01 = 2) can shift the parameters from right to left.

4.3.2 Displayed state of running parameters

After the AC drive receives valid running commands, the AC drive will enter into the running state and the keypad will display the running parameters , the "RUN" LED on the keypad is on, while the "FWD/REV" is determined by the current running direction which is shown as figure 4-2.

In the running state, there are 24 parameters can selected to be displayed or not. They are: running frequency, set frequency, bus voltage, output voltage, output torque, PID given value, PID feedback value, input terminals state, output terminals state, torque set value, length value, PLC and the current stage of multi-step speeds, pulse counting value,AI1,AI2,AI3,HDI,percentage of motor overload, percentage of AC drive overload, ramp given value, Linear speed, AC input current.F07.02 and F07.03 can select the parameter to be displayed or not by bit and press > > button can shift the parameters from left to right, press "S" (F7.01 = 2) can shift the parameters from right to left.

4.3.3 Displayed state of fault

If the AC drive detects the fault signal, it will enter into the fault pre-alarm displaying state. The keypad will display the fault code by flicking. The "TRIP key" LED on the keypad is on, and the fault reset can be operated by the "STOP/RST key" on the keypad, control terminals or communication commands.

4.3.4 Function Code Editor Displays Status

In the state of stopping, running or fault, press "PRG" to enter into editing state(if there is a password, see F07.00).The editing state is displayed on two classes of menu, and the order is: function code group/function code number > function code parameter, press "ENTER" into the displayed state of function parameter. On this state, you can press "ENTER" to save the parameters or press "PRG " to retreat.

4.4 Keypad Operation

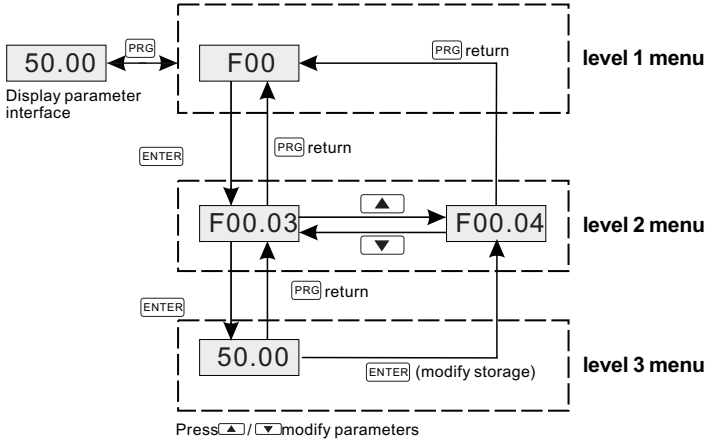
Operate the AC drive via operations panel. See the detailed structure description of function code in the brief diagram of function codes.

4.4.1 How to modify the function codes of the inverter

The AC drive has three-level menus, they are:

1. Group number of function code(first-level menu)
2. Tab of function code(second-level menu)
3. Set value of function code(third-level menu)

Operation procedure on the operation panel:



Note:

Press both the "PRG" and the "ENTER" key to return to level2 menu from the level3 menu. The difference is: pressing "ENTER" will save the set parameters into the control panel, and then return to the level2 menu with shifting to the next function code automatically; while pressing "PRG" will directly return to the level 2 menu without saving the parameters, and keep staying at the current function code.

In Level 3 menu, if the parameter has no blinking digit, it means that the parameter cannot be modified. This may be because:

a. Such a function code is only readable, such as, AC drive model, actually detected parameter and running record parameter;

b. Such a function code cannot be modified in the running state and can only be changed t stop.

Example: Set function code F0C.02 from 10.00Hz to 15Hhz.

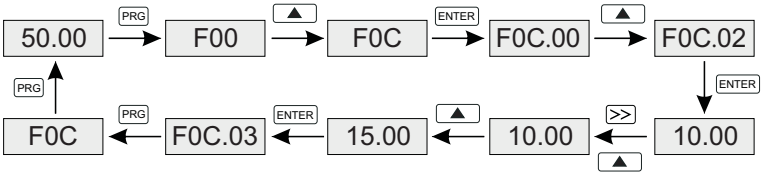


Figure 4-3 Modifying parameters diagram

4.4.2 Password Setting

4

HD500 series AC drive provide password protection function to users. Set F07.00 to gain the password and the password protection becomes valid instantly after quitting from the function code editing state. Press "PRG" again to the function code editing state,“0.0.0.0.0”will be displayed. Unless using the correct password, the operators cannot enter it.

Set F07.00 to 0 to cancel password protection function.

The password protection becomes effective instantly after retreating form the function code editing state. Press "PRG" again to the function code editing state, “0.0.0.0.0”will be displayed. Unless using the correct password, the operators cannot enter it.

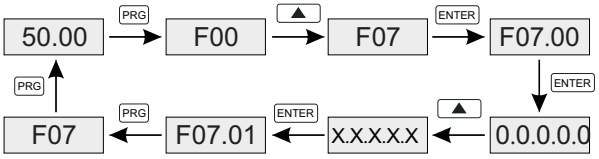


Figure 4-4 Password setting diagram

4.4.3 How to watch the AC drive state through function codes

HD500 series AC drive provide groupA02 as the sate inspection group. Users can enter into A02 directly to watch the state. Operations procedure as follows:

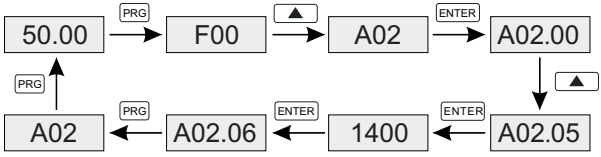


Figure 4-5 Motor speed diagram

Chapter 5

Function Parameter Table

5.1 Chapter of This Content

This chapter lists and describes the function parameters.

5.2 Function Parameter Table

The function parameters of HD500 series AC drive have been divided into 18 groups(F00-F0F and A01-A03) according to the function. Each function group contains certain function codes applying3-level menus. For example, "F08.08" means the eighth function code in the F8 group function, F0F group is factory Reserved, and users are forbidden to access these parameters.

For the convenience of function codes setting, the function group number corresponds to the first level menu, the function code corresponds to the level 2 menu and the function code corresponds to the level 3 menu.

1. Below is the instruction of the function lists:
   The first line"Function code":codes of function parameter group and parameters;
   The second line"Name":full name of function parameters;
   The third line"Setting range":effective setting value of the function parameters;
   The fourth line"Default value":the original factory values of the function parameter;
   The fifth line"Modify":the modifying character of function codes(the parameters can be modified or not and the modifying conditions), below is the instruction:
   "○" : means the set value of the parameter can be modified on stop and running state;
   "◎" : means the set value of the parameter can not be modified on the running state;
   "●" : means the value of the parameter is the real detection value which can not be modified.

2. "Parameter radix" is decimal(DEC), if the parameter is expressed by hex, then the parameter is separated from each other when editing. The setting range of the certain bits are0-F(hex).

3."The default value" means the function parameter will restore to the default value during default parameters restoring. But the detected parameter or recorded value won't be restored.

4. For a better parameter protection, the AC drive provides password protection to the parameters. After setting the password(set F07.00 to any non-zero number),the system will come into the state of password verification firstly after the user press "PRG" to come into the function code editing state .And then "0.0.0.0.0"will be displayed. Unless the user input right password, they cannot enter into the system. For the factory setting parameter zone, it needs correct factory password(remind that the users cannot modify the factory parameters by themselves, otherwise, if the parameter setting is incorrect, damage to the AC drive may occur).If the password protection is unlocked, the user can modify the password freely and the AC drive will work as the last setting one. When F07.00 is set to 0,the password can be canceled. If F07.00 is not 0 during powering on, then the parameter is protected by the password. When modify the parameters by serial communication the function of the password follows the above rules, too.

Function code	Name	Setup range	Default Value	Modification
Group F00 Basic Function Group				
F00.00	Motor 1 control mode	0 : V/F control 1 : Vector control 0 mode	1	◎
F00.01	Run command channel	0: Keypad run command channel(LED is OFF) 1: Terminal command channel / Keypad STOP disabled(LED is ON) 2: Terminal command channel / Keypad STOP enable(LED is ON) 3:Communication command / Keypad STOP disabled(LED is flashes) 4:Communication command / Keypad STOP enabled(LED is flashes)	0	○
F00.02	Communication run command channel selection	0: MODBUS Communication channel 1: CAN Communication channel 2: Profibus-DP communication channel Note: 1、2 means to extension, need to insert the card	0	○
F00.03	Max output frequency	F00.04~600.00Hz	50.00Hz	◎
F00.04	Upper limit frequency	F00.05~F00.03 (Maximum frequency)	50.00Hz	◎
F00.05	Lower limit frequency	0.00Hz~F00.04 (Operating frequency upper limit)	0.00Hz	◎
F00.06	A frequency command	0: Keypad digital setting 1: Keypad potentiometer setting 2 : Analog AI1 setting 3 : Analog AI2 setting 4 : Analog AI3 setting 5: High-speed pulse HDI1 setting 6 : Simple PLC program setting 7: Multi-speed running setting 8: PID control setting 9: MODBUS Communication setting 10: CAN Communication setting 11 : Profibus-DP communication setting Note: 10、11 means to extension function, need to insert the card	0	○
F00.07	B frequency command selection	0: Keypad digital setting 1: Keypad potentiometer setting 2 : Analog AI1 setting 3 : Analog AI2 setting 4 : Analog AI3 setting 5: High-speed pulse HDI1 setting 6 : Simple PLC program setting 7: Multi-speed running setting 8: PID control setting 9: MODBUS Communication setting 10: CAN Communication setting 11 : Profibus-DP communication setting	3	○

Function code	Name	Setup range	Default Value	Modification
F00.07	B frequency command selection	Note: 10、11 means to extension function, need to insert the card	3	○
F00.08	B frequency command reference	0：Maximum output frequency 1：A frequency command	0	○
F00.09	B frequency maximum output frequency	0.0~100.0%	100.0%	○
F00.10	Combination of the setting codes	0: A 1：B 2: (A+B) 3: (A-B) 4: MAX(A,B) 5: MIN(A,B)	0	○
F00.11	Keypad setting frequency	0.00 Hz~F00.03 (Max. frequency)	50.00Hz	○
F00.12	Acc-time 1	0.0~6000.0s	Depend on model	○
F00.13	Dec-time 1	0.0~6000.0s	Depend on model	○
F00.14	Running direction	0：Runs at the default direction 1：Runs at the reverse direction 2：Forbid to run in reverse direction	0	○
F00.15	Carrier frequency setting	1.0~16.0kHz	Depend on model	○
F00.16	Speed track direction setting	0: Forward and reverse can be tracked 1: Fixed forward track 2: Fixed reverse track	0	◎
F00.17	Motor parameter autotuning	0：No operation 1：Rotation autotuning 2：Static autotuning	0	◎
F00.18	Function restore parameter	0：No operation 1：Restore the default value 2：Cancel the fault record	0	◎
Group F01 Startup and stop Control				
F01.00	Start mode	0：Start-up directly 1：Start-up after DC braking 2：Start-up after Speed tracking	0	◎
F01.01	Starting frequency of direct start	0.00~10.00Hz	0.50Hz	◎
F01.02	Retention time of the starting frequency	0.0~100.0s	0.0s	◎
F01.03	The braking current before starting	0.0~150.0%	0.0%	◎

Function code	Name	Setup range	Default Value	Modification
F01.04	The braking time before starting	0.0~100.0s	0.0s	◎
F01.05	ACC/DEC selection	0 : Linear type 1 : S-curve type	0	◎
F01.06	S curve start ratio	0.0~50.0% (Acc/Dec time)	30.0%	◎
F01.07	S curve end ratio	0.0~50.0% (Acc/Dec time)	30.0%	◎
F01.08	Stop Mode	0 : Decelerate to stop 1 : Coast to stop	0	○
F01.09	Starting frequency of DC braking	0.00~F00.03 (Max. frequency)	0.00Hz	○
F01.10	Waiting time of DC braking	0.00~100.0s	0.05s	○
F01.11	Stopping DC braking current	0.0~150.0%	0.0%	○
F01.12	Stopping DC braking time	0.0~100.0s	0.0s	○
F01.13	Dead time of FWD/REV rotation	0.0~6000.0s	0.0s	○
F01.14	Stopping frequency	0.00~100.00Hz	0.50Hz	○
F01.15	Reserved	Reserved	0	●
F01.16	Reserved	Reserved	0	●
F01.17	The protection of theelectric terminals	0: Invalid operation command on terminal 1: valid operation command on terminal	0	○
F01.18	Select restart after power failure	0 : prohibit restart 1 : allow restart	0	○
F01.19	Restart waiting time	0.0~6000.0s (F01.18 equal to1is valid)	1.0s	○
F01.20	Reserved	Reserved	0	●
F01.21	Action if running frequency<lower limit frequency(valid>0)	0 : Operating frequency lower limit) 1 : Stop (close PWM output) 2 : Zero speed operation	0	◎
F01.22	Reserved	00.0~3600.0s(F01.21 equal to 2 is valid)	0.0s	○
Group F02 Motor 1 Parameter Group				
F02.00	Load Type	0 : G type (Constant torque/ overloaded type) 1 : P type (Variable torque/ lightload type)	0	◎
F02.01	Motor type 1	0 : Ordinary asynchronous motor (with low-frequency compensation) 1 : AC drive motor (without low frequency compensation)	0	◎

Function code	Name	Setup range	Default Value	Modification
F02.02	Rated power of motor 1	0.1~1000.0kW	Depend on model	◎
F02.03	Rated voltage of motor 1	0~1200V	Depend on model	◎
F02.04	Rated current of motor 1	0.8~6000.0A	Depend on model	◎
F02.05	Rated frequency of motor 1	0.01Hz~F00.03 (Maximum)	50.00Hz	○
F02.06	Rated speed of motor1	1~36000rpm	Depend on model	○
F02.07	Stator resistance of motor 1	0.001~65.535Ω	Depend on model	○
F02.08	rotor resistance of motor 1	0.001~65.535Ω	Depend on model	○
F02.09	leakage inductance of motor 1	0.1~6553.5mH	Depend on model	○
F02.10	Mutual inductance of motor 1	0.1~6553.5mH	Depend on model	○
F02.11	Non-load current of motor 1	0.1~6553.5A	Depend on model	○
F02.12 ~24	Reserved	0	0	●
F02.25	Motor 1 overload protection selection	0 : Protection is not valid 1: Protection is valid	1	◎
F02.26	Motor 1 overload protection coefficient	50.0~120.0%	100.0%	○
Group F04 V / F Control Group				
F04.00	Motor 1V / F curve setting	0 : Straight line V / F curve 1 : Multi-dots V / F curve 2 : 1.3th power low torque V/F curve 3 : 1.7th power low torque V/F curve 4 : 2.0th power low torque V/F curve 5 : Customized V/F(V/F separation)	0	◎
F04.01	Torque boost of motor 1	0.0% (automatic torque boost) 0.1%~20.0%(Manual torque boost)	0.0%	○
F04.02	Torque boost close of motor 1	0.0%~50.0% (Relative motor 1 rated frequency)	20.0%	○
F04.03	V/F frequency 1 of motor 1	0.00Hz~F04.05	0.00Hz	○
F04.04	V/F Voltage 1 of motor 1	0.0%~100.0% (motor1 rated voltage)	00.0%	○

Function code	Name	Setup range	Default Value	Modification
F04.05	V/F frequency 2 of motor 1	F04.03~F04.07	0.00Hz	○
F04.06	V/F Voltage 2 of motor 1	0.0%~100.0% (motor1 rated voltage)	00.0%	○
F04.07	V/F frequency 3 of motor 1	F04.05~F02.02 (motor1 rated frequency)	0.00Hz	○
F04.08	V/F Voltage 3 of motor 1	0.0%~100.0% (motor1 rated voltage)	00.0%	○
F04.09	V/F slip compensation on gain of motor 1	0.0~200.0%	100.0%	○
F04.10	Vibration control factor at low frequency of motor 1	0~30	2	○
F04.11	Vibration control factor at high frequency of motor 1	0~30	2	
F04.12	Vibration control threshold of motor 1	0.00Hz~F00.03 (max. frequency)	30.00Hz	○
F04.13	Motor 2 V/F curve setting	0 : Straight V / F curve 1 : Multi-point V / F curve 2 : 1.3 thpower decreasing torque V/F curve 3 : 1.7 th power decreasing torque V/F curve 4 : 2.0 th power decreasing torque V/F curve 5 : Custom V / F (V / F separation)	0	◎
F04.14	Torque boost of motor 2	0.0% (automatic torque boost) 0.1%~20.0%	0.0%	○
F04.15	Torque boost close of motor 2	0.0%~50.0% (relative to motor rated frequency)	20.0%	○
F04.16	V/F frequency 1 of motor 2	0.00Hz~F04.18	0.00Hz	○
F04.17	V/F voltage 1 of motor 2	0.0%~100.0% (motor 2 rated voltage)	00.0%	○
F04.18	V/F frequency 2 of motor 2	F04.16~F04.20	00.00Hz	○
F04.19	V/F voltage 2 of motor 2	0.0%~100.0% (motor 2 rated voltage)	00.0%	○
F04.20	V/F frequency 3 of motor 2	F04.18~F0D.06 (motor 2 rated frequency)	00.00Hz	○
F04.21	V/F voltage 3 of motor 2	0.0%~100.0% (motor 2 rated voltage)	00.0%	○
F04.22	V/F slip compensation gain of motor 2	0.0~200.0%	100%	○
F04.23	Vibration control factor at low frequency of motor 2	0~30	2	○
F04.24	Vibration control factor at high frequency of motor 2	0~30	2	○
F04.25	Vibration control threshold of motor 2	0.00Hz~F00.03 (max. frequency)	30.00Hz	○

Function code	Name	Setup range	Default Value	Modification
F04.26	Energy-saving operation	0 : No operation 1 : Automatic energy-saving operation	0	◎
F04.27	Voltage setting	0 : Keypad: the output voltage is determined by F04.28 1 : AI1 setting voltage 2 : AI2 setting voltage 3 : AI3 setting voltage 4 : HDI1 setting voltage 5 : Multi-setp setting voltage (setting value is determined by F0B set of parameters of multi-speed) 6 : PID setting voltage 7 : MODBUS communication setting voltage 8: CAN communication setting voltage 9 : Profibus-DP Communication setting voltage Note: 8、9 means to extension, it need to insert the card	0	○
F04.28	Keypad setting voltage	0.0%~100.0%	100.0%	○
F04.29	Voltage increasing time	0.0~6000.0s	5.0s	○
F04.30	Voltage decreasing time	0.0~6000.0s	5.0s	○
F04.31	Maximum output voltage	F04.32~100.0% (the rated voltage of the motor)	100.0%	◎
F04.32	Minimum output voltage	0.0%~F04.31 (the rated voltage of the motor)	0.0%	◎
F04.33	AVR function selection	0 : Invalid 1 : Valid	1	○
F04.34	Reserved	0	0	●
Group F05 Input Terminal Group				
F05.00	HDI1 input selection	0: High pulse input (see F05.29 ~ F05.34) 1: Digital inputs (see F05.08)	0	◎
F05.01	DI1 terminals function selection	0 : No function 1 : Forward rotation operation 2 : Reverse rotation operation 3 : Three-wire control operation 4 : Forward Jogging 5 : Reverse Jogging 6 : Coast to stop 7 : Fault reset 8 : Operation Pause 9 : External fault input 10 : Increase frequency setting (UP) 11 : Decrease frequency setting (DOWN) 12: Frequency setting clear 13 : Shift between A setting and B setting 14 : Shift between combination setting and A setting	1	◎
F05.02	DI2 terminals function selection		4	◎
F05.03	DI3 terminals function selection		7	◎

Function code	Name	Setup range	Default Value	Modification
F05.05	DI5 terminals function selection	15 : Shift between combination setting and B setting 16 : Multi-step speed terminal 1 17 : Multi-step speed terminal 2 18 : Multi-step speed terminal 3 19 : Multi-step speed terminal 4 20 : Multi-step speed pause 21 : DEC/ACC time 1 22 : DEC/ACC time 2 23 : Simple PLC stop reset 24 : Simple PLC pause 25 : PID control pause 26 : Traverse pause (stop at the current frequency) 27 : Traverse reset (return to the center frequency) 28 : Counter reset 29 : Torque control disabling 30 : DEC/ACC disabling 31 : Counter trigging 32 : Length reset 33 : Cancel the frequency change setting temporarily 34 : DC brake 35 : Shift the motor 1 into motor 2 36 : Shift the command to the keypad 37 : Shift the command to the terminal1 38 : Shift the command to the terminal 2 39 : Shift the command to the communication 1 40 : Shift the command to the communication 2 41: Depend on model 42: PID Parameters Switching 43 : External terminal stop (equal to keypad STOP) 44:PID second digital given switching terminal	0	◎
F05.06	DI6 terminals function selection		0	◎
F05.07	DI7 terminals function selection		0	◎
F05.08	HDI1 terminal function selection		0	◎
F05.09	Polarity selection of the input terminals	0x00~0xFF	0x00	○
F05.10	ON-OFF filter time	0.000~1.000s	0.010s	○
F05.11	Virtual terminals setting	0 : Virtual terminal disabled 1 : MODBUS communication virtual terminal enabled 2 : CAN communication virtual terminal is valid 3 : Profibus-DP communication virtual terminal is valid	0	○
F05.12	Terminals control running mode	0 : 2-wire control 1 1 : 2-wire control 2 2 : 3-wire control 1 3 : 3-wire control 2	0	◎
F05.13	Switch-on delay of DI1 terminal	0.000~50.000s	0.000s	○
F05.14	Switch-off delay of DI1 terminal	0.000~50.000s	0.000s	○

Function code	Name	Setup range	Default Value	Modification
F05.15	Switch-on delay of DI2 terminal	0.000~50.000s	0.000s	○
F05.16	Switch-off delay of DI2 terminal	0.000~50.000s	0.000s	○
F05.17	Switch-on delay of DI3 terminal	0.000~50.000s	0.000s	○
F05.18	Switch-off delay of DI3 terminal	0.000~50.000s	0.000s	○
F05.19	Switch-on delay of DI4 terminal	0.000~50.000s	0.000s	○
F05.20	Switch-off delay of DI4 terminal	0.000~50.000s	0.000s	○
F05.21	Switch-on delay of DI5 terminal	0.000~50.000s	0.000s	○
F05.22	Switch-off delay of DI5 terminal	0.000~50.000s	0.000s	○
F05.23	Switch-on delay of DI6 terminal	0.000~50.000s	0.000s	○
F05.24	Switch-off delay of DI6 terminal	0.000~50.000s	0.000s	○
F05.25	Switch-on delay of DI7 terminal	0.000~50.000s	0.000s	○
F05.26	Switch-off delay of DI7 terminal	0.000~50.000s	0.000s	○
F05.27	Switch-on delay of HDI1 terminal	0.000~50.000s(only F05.00=1 enable)	0.000s	○
F05.28	Switch-off delay of HDI1 terminal	0.000~50.000s(only F05.00=1 enable)	0.000s	○
F05.29	Hdi high-speed pulse input function selection	0 : Frequency setting input 1 : Counter input 2 : Length counting input	0	◎
F05.30	Lower limit frequency of Hdi1	0.00KHz~F05.32	0.00 KHz	○
F05.31	Corresponding setting of lower limit frequency of HDI1	-100.0%~100.0%	0.0%	○
F05.32	Upper limit frequency of HDI 1	F05.30~50.00KHz	50.00 KHz	○
F05.33	Corresponding setting of upper limit frequency of HDI1	-100.0%~100.0%	100.0%	○
F05.34	HDI1 frequency input filter time	0.000s~10.000s	0.100s	○

Function code	Name	Setup range	Default Value	Modification
F05.35	Reserved	0	0.010s	●
Group F06 Output Terminal Group				
F06.00	HDO1 output	0 : Open collector pole high speed pulse output(See F06.16 for detailed information of the related function) 1 : Open collector pole output(See F06.02 for detailed information of the related function)	0	◎
F06.01	DO1 output	0 : Invalid 1 : In operation 2 : Forward rotation operation 3 : Reverse rotation operation 4 : Jogging operation 5 : AC drive fault 6 : Frequency degree test FDT1 7 : Frequency degree test FDT2 8 : Frequency arrival 9 : Zero-speed running 10 : Upper limit frequency arrival 11 : Lower limit frequency arrival 12 : Ready for operation 13 : Pre-Magnetizing 14 : Overload pre-alarming 15 : Underload per-alarming 16 : Completion of Simple PLC stage 17 : Completion of Simple PLC Circle 18 : Setting count value arrival 19 : Defined count value arrival 20 : External fault valid 21 : Length arrival 22 : Running time arrival 23 : MODBUS communications virtual terminal output 24 : AC drive is sleeping 25~30 : Reserved	0	○
F06.02	HDO1 output		0	○
F06.03	Relay T1 output		1	○
F06.04	Relay T2 output		5	○
F06.05	Polarity of output terminals	0x00~0x0F : BIT3 BIT2 BIT1 BIT0 T2 T1 HDO1 DO1	0x00	○
F06.06	DO1 switch-on delay time	0.000~50.000s	0.000s	○
F06.07	DO1 switch- off delay time	0.000~50.000s	0.000s	○
F06.08	HDO1 switch-on delay time	0.000~50.000s(only F06.00=1 enable)	0.000s	○
F06.09	HDO1 switch- off delay time	0.000~50.000s(onlyF06.00=1 enable)	0.000s	○
F06.10	T1 switch-on delay time	0.000~50.000s	0.000s	○
F06.11	T1 switch-off delay time	0.000~50.000s	0.000s	○
F06.12	T2 switch-on delay time	0.000~50.000s	0.000s	○
F06.13	Relay T2 switch-off delay time	0.000~50.000s	0.000s	○

Function code	Name	Setup range	Default Value	Modification
F06.14	AO1 output	0：Running frequency 1：Set frequency 2：Ramp reference frequency 3：Running rotation speed 4：Output current (relative to the rated current of AC drive) 5：Output current (relative to the rated current of the motor) 6：Output voltage 7：Output torque 8：Set torque value 9：Output torque 10：Analog AI1 input value 11：Analog AI2 input value 12：Analog AI3 input value 13：High speed pulse HDI1 input value 14：PID reference 15：PID feedback 16：Modbus communications reference 1 17：Modbus communications reference 2 18：Bus voltage 19~20：Reserved	0	○
F06.15	AO2 output		0	○
F06.16	HDO1 output		0	○
F06.17	Lower output limit of AO1	-100.0%~F06.19	0.0%	○
F06.18	Corresponding AO1 output of lower limit	-10.00V~10.00V	0.00V	○
F06.19	Upper output limit of AO1	F06.17~100.0%	100.0%	○
F06.20	The corresponding AO1 output of upper limit	-10.00V~10.00V	10.00V	○
F06.21	AO1 output filter time	0.000s~10.000s	0.000s	○
F06.22	Lower output limit of AO2	-100.0%~F06.24	0.0%	○
F06.23	Corresponding AO2 output of lower limit	-10.00V~10.00V	0.0%	○
F06.24	Upper output limit of AO2	F06.22~100.0%	100.0%	○
F06.25	The corresponding AO2 output of upper limit	0.00V~10.00V	10.00V	○
F06.26	AO2 output filter time	0.000~10.000s	0.000s	○
F06.27	Lower output limit of HDO1	0.0%~F06.29	0.0%	○
F06.28	Corresponding HDO1 output of lower limit	0.00~50.00kHz	0.00Hz	○
F06.29	Upper output limit of HDO1	F06.27~100.0%	100.0%	○
F06.30	Corresponding HDO1 output of upper limit	0.00~50.00kHz	50.00 kHz	○
F06.31	HDO1 output filter time	0.000s~10.000s	0.000s	○
Group F07 HMI Group				
F07.00	User's password	0~65535	0	○

Function code	Name	Setup range	Default Value	Modification
F07.01	The key of S function selection	0 : Without function 1 : Jogging 2 : Shift the display state by the shifting key 3 : Shift between forward rotations and reverse rotations 4 : Clear UP / DOWN settings 5 : Coast to stop 6 : Command source switch	0	◎
F07.02	Parameters state 1	0x0000~0xFFFF BIT0 : Running frequency (Hz ON) BIT1 : Setting frequency (Hz flickering) BIT2 : Bus voltage (V ON) BIT3 : Output voltage (V ON) BIT4 : Output current (A ON) BIT5 : Runing rotation speed (rpm ON) BIT6 : Output power (% ON) BIT7 : Output torque (% ON) BIT8 : PID reference (% ON) BIT9 : PID feedback (% ON) BIT10 : Input state BIT11 : Output terminal state BIT12: Torque setting value (% ON) BIT13: Pulse count value BIT14: Length value BIT15: PLC current segment number	0x11	○
F07.03	Parameters state 2	0x0000~0x03FF BIT0 : The current number of multistage speed BIT1 : AI1(V on) BIT2 : AI2(V on) BIT3 : AI3(V on) BIT4 : HDI frequency BIT5 : Motor overload precentage(% on) BIT6 : The inverter overload percentage(% on) BIT7 : Ramp frequency given value(Hz on) BIT8 : Linear speed BIT9 : AC inlet current(A on) BIT10 : Set rotary speed BIT11 : Set linear speed BIT112 : IGBT temperature BIT113~15 : Reserve	0X0000	○
F07.04	Parameters for stopping state	0x0000~0x7FFF BIT0 : Set frequency(Hz on, frequency flicking slowly) BIT1 : Bus voltage(V on) BIT2 : Input terminals state BIT3 : Output terminals state BIT4 : PID reference(% flicking) BIT5 : Set rotary speed BIT6 : Ttorque refernece(% on) BIT7 : AI1(V on) BIT8 : AI2(V on) BIT9 : AI3(V on) BIT10 : HDI1 frequency	0x00FF	○

Function code	Name	Setup range	Default Value	Modification
F07.04	Parameters for stopping state	BIT11：PLC current stage BIT12： Set linear speed BIT13：Pulse counters BIT14：Length value BIT15：IGBT temperature	0x00FF	○
F07.05	Frequency coefficient	0.01~20.00 Display frequency=Running frequency ×F07.05	1.00	○
F07.06	Rotation Speed	0.1~999.9% Mechanical rotation speed=60× running frequency×F07.06/Motor pole pairs	100.0%	○
F07.07	Linear speed coefficient	0.1~999.9% Mechanical rotation speed=60×diapalyed running frequency×F07.06/Motor pole pairs	100.0%	○
F07.08	Rectifier bridge module temperature	20.0~120.0	----	●
F07.09	Converter module temperature	20.0~120.0	----	●
F07.10	Software version	1.00~655.35	----	●
F07.11	Local accumulative running time	0~65535h	----	●
F07.12	Reserved	0	----	●
F07.13	Reserved	0	----	●
F07.14	Load Type	0：G type Constant torque load 1：P type Variable torque load	----	●
F07.15	AC drive rated power	0.4~1000.0kW	----	●
F07.16	AC drive rated voltage	20~1200V	----	●
F07.17	AC drive rated current	0.1~6000.0A	----	●
F07.18	Current fault type	Please refer to Chapter 8	----	●
F07.19	The 1 times before fault type		----	●
F07.20	The 2 times before fault type		----	●
F07.21	The 3 times before fault type		----	●
F07.22	The 4 times before fault type		----	●
F07.23	The 5 times before fault type		----	●
F07.24	Running frequency at current fault	----	0.00Hz	●

Function code	Name	Setup range	Default Value	Modification
F07.25	Ramp reference frequency at current fault	----	0.00Hz	●
F07.26	output voltage at the current fault	----	0V	●
F07.27	output current at current fault	----	0.0A	●
F07.28	Bus voltage at current fault	----	0.0V	●
F07.29	The Max. temperature at current fault	----	0.0	●
F07.30	Input terminals state at current fault	----	0	●
F07.31	Output terminals state at current fault	----	0	●
F07.32	Running frequency at previous fault	----	0.00Hz	●
F07.33	Ramp reference frequency at previous fault	----	0.00Hz	●
F07.34	Output voltage at previous fault	----	0V	●
F07.35	The output current at previous fault	----	0.0A	●
F07.36	Bus voltage at previous fault	----	0.0V	●
F07.37	The Max. temperature at previous fault	----	0.0℃	●
F07.38	Input terminals state at previous fault	----	0	●
F07.39	Output terminals state at previous fault	----	0	●
F07.40	Running frequency at previous 2 fault	----	0.0A	●
F07.41	Ramp reference frequency at previous 2 fault	----	0.0V	●
F07.42	Output voltage at previous 2 faults	----	0.0℃	●
F07.43	Output current at previous 2 fault	----	0	●
F07.44	Bus voltage at previous 2 fault	----	0	●
F07.45	The Max. temprature at previous 2 fault	----	0.0℃	●

Function code	Name	Setup range	Default Value	Modification
F07.46	Input terminals state at previous 2 fault	----	0	●
F07.47	Output terminals state at previous 2 fault	----	0	●
Group F08 Strengthen Function Groups				
F08.00	ACC time2	0.0~6000.0s	Model dependent	○
F08.01	DEC time2	0.0~6000.0s	Model dependent	○
F08.02	ACC time3	0.0~6000.0s	Model dependent	○
F08.03	DEC time3	0.0~6000.0s	Model dependent	○
F08.04	ACC time4	0.0~6000.0s	Model dependent	○
F08.05	DEC time4	0.0~6000.0s	Model dependent	○
F08.06	Jogging frequency	0.00~F00.03 (Max. frequency)	5.00Hz	○
F08.07	Jogging ACC time	0.00~F00.03 (Max. frequency)	Model dependent	○
F08.08	Jogging DEC time	0.00~F00.03 (Max. frequency)	Model dependent	○
F08.09	Fault reset times	0~10	0	○
F08.10	Interval time of automatic fault reset	0.1~100.0s	1.0s	○
F08.11	Frequency decreasing ratio of the dropping control	0.00~10.00Hz	0.00Hz	○
F08.12	Motor shifting	0 : Terminal shifting 1 : MODBUS Communication shifting 2 : CAN Communication shifting 3 : Profibus-DP communication switch Note: 2,3 is function, only valid with card.	0	◎
F08.13	FDT1 electrical level detection value	0.00~F00.03 (Max. frequency)	50.00Hz	○
F08.14	FDT1 retention detection value	-100.0~100.0% (FDT1electricallevel)	5.0%	○
F08.15	FDT2 electrical level detection	0.00~F00.03 (Max. frequency)	50.00Hz	○
F08.16	FDT2 retention detection value	-100.0~100.0% (FDT2 level)	5.0%	○

Function code	Name	Setup range	Default Value	Modification
F08.17	Frequency arrival detection value	0.0~F00.03 (Max. frequency)	0.00Hz	○
F08.18	Energy braking enable	0 : Disable 1 : Enable	0	○
F08.19	Threshold voltage	100.0~2000.0V	220V (380V) 380V (700V)	○
F08.20	PWM over commission selection	0 : Invalid 1 : Valid	1	◎
F08.21	Keypad data control	0x000~0x1221 LED ones: Frequency control selection 0 : ∧/vkeys are valid 1 : ∧/vkey are invalid LED tens: Frequency control selection 0 : Only valid when F00.06=0 orF00.07=0 1 : Valid for all frequency setting manner 2 : Invalid for multi-step when multi-step has the priority LED hundreds: Action selection during stopping 0 : Setting is valid 1 : Valid during running, cleared after stopping 2 : Valid during running, cleared after receiving the stop command LED thousands: ∧/v keys integral function 0 : The integral function is valid 1 : The integral function is invalid	0x0000	○
F08.22	Integral ratio of the keypad∧/v	0.1~100.0s	1.0s	○
F08.23	UP/DOWN terminal control	0x00~0x221 LED ones: Frequency control selection 0 : UP/DOWN terminals setting valid 1 : UP/DOWN terminals setting invalid LED tens: Frequency control selection 0 : Only valid when F00.06=0 or F00.07=0 1 : All frequency means are valid 2 : When the multi-step are priority, it is invalid to the multi-step LED hundreds: Action selection when stop 0 : Setting valid 1 : Valid in the running, clear after stop 2 : Valid in the running, clear after receiving the stop commands	0x0000	○
F08.24	UP terminals frequency changing ratio	0.01~50.00s	0.50s	○
F08.25	DOWN terminals frequency changing ratio	0.01~50.00s	0.50s	○

Function code	Name	Setup range	Default Value	Modification
F08.26	Frequency setting at power loss	0x000~0x111 LED ones: Action selection when power off 0 : Save when power off 1 : Clear when power off LED tens: Action selection when MODBUS set frequency off 0 : Save when power off 1 : Clear when power off LED hundreds: Action selection when other frequency set frequency off 0 : Save when power off 1 : Clear when power off	0x0000	○
F08.27	Magnetic flux braking	0 : Invalid 1~100: The bigger the coefficient, the stronger the braking is)	0.50s	○
F08.28	Auxiliary Monitoring	0 : Running frequency 1 : Set frequency 2 : Bus voltage 3 : Output voltage 4 : output current 5 : Running rotation speed 6 : Output power 7 : Output torque 8 : PID reference 9 : PID feedback 10 : Input terminals state 11 : Output terminals state 12 : Torque setting value 13 : Pulse counter value 14 : Length value 15 : PLC current stage 16 : The current number of multi-stage speed 17 : AI1 value 18 : AI2 value 19 : AI3 value 20 : HDI1 frequency 21 : Motor overload percentage(% on) 22 : AC drive overload percentage(% on) 23 : Ramp frequency given value(Hz on) 24 : Linear speed 25 : AC inlet current(A on) 26 : set rotary speed 27 : set linear speed 28 : IGBT temperature	1	○
F08.29	Reserved	0	0	●
F08.30	IO expansion card	0: Enable 1: Disable	0	○
F08.31	Power failure under voltage decelerate stop	0 : invalid 1 : valid	0	○

Function code	Name	Setup range	Default Value	Modification
F08.32	Power failure under voltage decelerate time	0~6000.0 s	0	○
F08.33	Run power failure decelerate cut-off voltage	80~800V (200V (3 phase) / 120V (single phase))		◎
F08.34	Detection time 1 of arbitrary frequency arrival	0~F00.03	50.00Hz	○
F08.35	Detection width 1 of arbitrary frequency arrival	0~100.0%(Max. frequency)	0	○
F08.36	Detection time 2 of arbitrary frequency arrival	0~F00.03	50.00Hz	○
F08.37	Detection width 2 of arbitrary frequency arrival	0~100.0%(Max. frequency)	0	○
Group F09 PID control Group				
F09.00	PID reference source	0：Keypad (F09.01) 1:AI1 2:AI2 3:AI3 4:HDI 5：Multi-step speed set 6：MODBUS communication set 7：CAN communication setting 8：Profibus-DP Communication set Note: 7、8 CAN communication setting need corresponding extension cards.	0	○
F09.01	Keypad PID preset	0~100.0%	50.0%	○
F09.02	Keypad feedback source	0:AI1 1:AI2 2:AI3 3:HDI 4:MODBUS communication set 5:CAN communication setting 6:Profibus-DP communication feedback Note: 5 、6 CAN communication setting need corresponding extension cards.	0	○
F09.03	PID output feature	0：PID output is positive 1：PID output is negative	0	○
F09.04	Proportional gain(Kp)	0.00~100.00	0.50	○
F09.05	Intergal time(Ti)	0.00~10.00s	0.20s	○
F09.06	Differential time(Td)	0.00~10.00s	0.00s	○
F09.07	Sampling cycle(T)	0.00~10.00s	0.10s	○

Function code	Name	Setup range	Default Value	Modification
F09.08	PID control deviation limit	0.00~10.00%	0.0%	○
F09.09	Output upper limit of PID	F09.10~100.0%(max. frequency or voltage)	0.0%	○
F09.10	Output lower limit of PID	-100.0~F09.09(max. frequency or voltage)	100.0%	○
F09.11	Detection value of feedback offline	0.0~100.0%	0.0%	○
F09.12	Detection time of feedback offline	0.0~3600.0s	1.0s	○
F09.13	PID adjustment	Please refer to Chapter 6 Group F09.13 for details.	0x0000	○
F09.14	Proportional gain 2(Kp2)	0.00~100.00	0.50	○
F09.15	Integral time(Ti2)	0.00~10.00s	0.2S	○
F09.16	Differential time(Td2)	0.00~10.00s	0.00S	○
F09.17	PID Parameters Switching	0: No switching 1: According to the switching input bias 2: According terminal switching	0	◎
F09.18	Deviation threshold when PID is switching	0.0%~100.0%	20%	○
F09.19	PID Hibernate Frequency	0.00~F00.03(Max Frequency)	0.0	○
F09.20	PID Hibernate Delay Time	0.0~3600.0s	30.0s	○
F09.21	PID Awaken Value	0.0~100.0%	0.0%	○
F09.22	PID Awaken Value delay time	0.0~60.0s	0.5S	○
F09.23	PID Preset Value	0.0~100.0%	0.0%	○
F09.24	PID Preset Value Keeping time	0.0~600.0s	0.0s	○
F09.25	PID initial value restarts effective selection	0: the frequency source is given from other given switching to PID, and the initial value is invalid. 1: the frequency source runs efficiently from other given handover to PID given.	0.0s	○
F09.26	PID second digital given	0.0~100.0% , Note: through terminal function: 44, implement PID given source switch	50.0%	○
Group F0A Swing Frequency, Fixed Length, Count and Timing				
F0A.00	Swing frequency amplitude	0.0~100.0%(Setting frequency)	0.0%	○
F0A.01	Kick frequency amplitude	0.0~100.0%(Swing frequency amplitude)	0.0%	○
F0A.02	Rise time of swing frequency	0.0~3600.0s	0.0s	○
F0A.03	Decline time of swing frequency	0.0~3600.0s	0.0s	○

Function code	Name	Setup range	Default Value	Modification
F0A.04	Setup length	0~65536m	0m	○
F0A.05	Designed length	0~65536m	0m	●
F0A.06	The number of pulses of each rotate	1~10000	1	○
F0A.07	Circumference of the shaft	0.01~100.00cm	10.00cm	○
F0A.08	Length multiples	0.001~10.000	1.000	○
F0A.09	Length correction factor	0.001~1.000	1.000	○
F0A.10	Set count value	F0A.11~65535	0	○
F0A.11	Designated count value	0~F0A.10	0	○
F0A.12	Running time setting	0~65535min	0	○
F0A.13	Exact stop mode	0 : invalid 1 : setting length arrive 2 : setting count value arrive 3 : setting running time arrive	0	○
F0A.14	Reserved	0	0	●
Group F0B Simple PLC and Multi-speed Control Group				
F0B.00	Simple PLC running method	0: Stop after running once 1: Run at the final value after running once 2: Cycle running	0	○
F0B.01	Simple PLC memory selection when in power loss	0: Power loss without memory 1: Power loss memory	0	○
F0B.02	Multi-step speed 0	-100.0~100.0%	0.0%	○
F0B.03	The running time of step 0	0.0~6553.5s(min)	0.0s	○
F0B.04	Multi-step speed 1	-100.0~100.0%	0.0%	○
F0B.05	The running time of step 1	0.0~6553.5s(min)	0.0s	○
F0B.06	Multi-step speed 2	-100.0~100.0%	0.0%	○
F0B.07	The running time of step 2	0.0~6553.5s(min)	0.0s	○
F0B.08	Multi-step speed 3	-100.0~100.0%	0.0%	○
F0B.09	The running time of step 3	0.0~6553.5s(min)	0.0s	○
F0B.10	Multi-step speed 4	-100.0~100.0%	0.0%	○
F0B.11	The running time of step 4	0.0~6553.5s(min)	0.0s	○
F0B.12	Multi-step speed 5	-100.0~100.0%	0.0%	○
F0B.13	The running time of step 5	0.0~6553.5s(min)	0.0s	○
F0B.14	Multi-step speed 6	-100.0~100.0%	0.0%	○
F0B.15	The running time of step 6	0.0~6553.5s(min)	0.0s	○
F0B.16	Multi-step speed 7	-100.0~100.0%	0.0%	○

Function code	Name	Setup range	Default Value	Modification
F0B.17	The running time of step 7	0.0~6553.5s(min)	0.0s	○
F0B.18	Multi-step speed 8	-100.0~100.0%	0.0%	○
F0B.19	The running time of step 8	0.0~6553.5s(min)	0.0s	○
F0B.20	Multi-step speed 9	-100.0~100.0%	0.0%	○
F0B.21	The running time of step 9	0.0~6553.5s(min)	0.0s	○
F0B.22	Multi-step speed 10	-100.0~100.0%	0.0%	○
F0B.23	The running time of step 10	0.0~6553.5s(min)	0.0s	○
F0B.24	Multi-step speed 11	-100.0~100.0%	0.0%	○
F0B.25	The running time of step 11	0.0~6553.5s(min)	0.0s	○
F0B.26	Multi-step speed 12	-100.0~100.0%	0.0%	○
F0B.27	The running time of step 12	0.0~6553.5s(min)	0.0s	○
F0B.28	Multi-step speed 13	-100.0~100.0%	0.0%	○
F0B.29	The running time of step 13	0.0~6553.5s(min)	0.0s	○
F0B.30	Multi-step speed 14	-100.0~100.0%	0.0%	○
F0B.31	The running time of step 14	0.0~6553.5s(min)	0.0s	○
F0B.32	Multi-step speed 15	-100.0~100.0%	0.0%	○
F0B.33	The running time of step 15	0.0~6553.5s(min)	0.0s	○
F0B.34	Simple PLC 0-7 step ACC/DEC time	0x0000~0xFFFF	0x0000	○
F0B.35	Simple PLC 8-15 step ACC/DEC time	0x0000~0xFFFF	0x0000	○
F0B.36	PLC restart	0: Restart from the first stop 1: Continue to run from the stage range frequency 2: Continue to run from the running frequency	0	◎
F0B.37	Multi-step time unit	0: S 1: Min	0	◎
Group F0C Protection Parameters Group				
F0C.00	Phase loss protection	0x00~0x11 LED ones: 0: Input phase loss protection disable 1: Input phase loss protection enable LED tens: 0: Input phase loss protection disable 1: Input phase loss protection enable	0x11	◎
F0C.01	Frequency decreasing at sudden power loss	0: Enable 1: Disable	0	○
F0C.02	Frequency decreasing ratio at sudden power loss	0.00Hz~F00.03/s (Max. frequency)	10.00 Hz/s	◎

Function code	Name	Setup range	Default Value	Modification
F0C.03	Over-voltage stall protection	0: Invalid 1: Valid	1	○
F0C.04	Voltage protection of over-voltage stall	120~150% (AC drive standard bus voltage)	120% (220V) 140% (380V)	○
F0C.05	Current limit action selection	0: Disable 1: Enable	1	◎
F0C.06	Automatic current limit	50.0~200.0%	166%(G-type load) 120%(P-type load)	○
F0C.07	Frequency decreasing ratio during current limit	0.00~50.00Hz/s	10.00 Hz/s	◎
F0C.08	Phase loss protection	0x000~0x111 LED ones : 0: Overload pre-alarm of the motor, relative to the rated current of the motor 1: Overload pre-alarm of the AC drive, relative to the rated current of the AC drive LED tens : 0: The AC drive continues to work after underload pre-alarm 1: The AC drive continues to work after underload pre-alarm and the AC drive stops to run after overload fault	0x0000	○
F0C.08	Phase loss protection	LED hundreds: 0: Detection all the time 1: Detection in constant running	0x0000	○
F0C.09	Overload pre-alarm detection	F0C.12~200%	G type:150% P type: 120%	○
F0C.10	Overload pre-alarm detection time	0.1~60.0s	0.0s	○
F0C.11	Underload pre-alarm of motor/AC drive	0x000~0x111 LED ones: 0: Motor underload pre-alarm, relative to the motor rated current 1: Motor underload pre-alarm, relative to the AC drive rated current LED tens: 0: AC drive continue running after overload alarm 1: AC drive stops after underload fault LED hunreds: 0: Detection all the time 1: Detection in constant running	0x0000	○
F0C.12	Underload pre-alarm detection	0%~F0C.09	30%	○

Function code	Name	Setup range	Default Value	Modification
F0C.13	Underload pre-alarm detection time	0.1~60.0s	1.0s	○
F0C.14	Output terminal action during fault	0x00~0x11 LED ones: 0: Action under fault undervoltage 1: No action under fault undervoltage LED tens: 0: Action during the automatic reset 1: No action during the automatic reset	0x0000	○
F0C.15	Carrier frequency adjustment selection	0x00~0x11 LED ones: 0: Fixed carrier frequency 1: Carrier frequency automatically adjust as the temperature arises. LED tens: 0: Fixed carrier frequency 1: Carrier frequency is automatically adjusted when it is overloaded	0x0000	○
F0C.16	PWM mode	0: Three-phase modulation 1: Three-phase and two-phase modulation switching	1	◎
F0C.17	Low frequency filter selection	0: Low frequency filter valid 1: Low frequency filter invalid	1	◎
F0C.18	Reserved	0	0	●
Group F0D Motor 2 Parameter Group				
F0D.00	Motor type 2 control mode	0: V/F control 1: Vector mode 0 control	0	◎
F0D.01	Load type	0 : G-type (constant torque load) 1 : P-type (variable torque / light load)	0	◎
F0D.02	Motor type2	0 : Ordinary asynchronous motor (with low-frequency compensation) 1 : Frequency asynchronous motor (without low frequency compensation)	0	◎
F0D.03	Rated power of motor 2	0.1~3000.0kW	Depend on model	◎
F0D.04	Rated voltage of motor 2	0~1200V	Depend on model	◎
F0D.05	Rated current of motor 2	0.8~6000.0A	Depend on model	◎
F0D.06	Rated frequency of motor 2	0.01Hz~F00.03 (max. frequency)	Depend on model	◎
F0D.07	Rated speed of motor 2	1~36000rpm	Depend on model	◎
F0D.08	Stator resistor of motor2	0.001~65.535Ω	Depend on model	◎

Function code	Name	Setup range	Default Value	Modification
F0D.09	Rotor resistor of motor 2	0.001~65.535Ω	Depend on model	◎
F0D.10	Leakage inductance of motor 2	0.1~6553.5mH	Depend on model	◎
F0D.11	Mutual inductance of motor 2	0.1~6553.5mH	Depend on model	◎
F0D.12	Non-load current of motor 2	0.1~6553.5A	Depend on model	◎
F0D.13 ~25	Reserved	0	0	●
F0D.26	Motor 2 overload protection selection	0 : Invalid 1 : Valid	1	◎
F0D.27	Motor 2 overload protection factor	50.0%~120.0%	100.0%	◎
Group F0E Serial Communication Function Group				
F0E.00	Local communication address	0~247 (0 is communication address)	1	○
F0E.01	Communication baud ratio	0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS	4	○
F0E.02	Digital bit checkout	0: No check(N, 8, 1)for RTU 1 : Even check (E, 8, 1) for RTU 2 : Odd check (O ,8, 1) for RTU 3 : No check (N, 8, 2) for RTU 4 : Even check (E, 8, 2) for RTU 5 : Odd check (O, 8, 2) for RTU	1	○
F0E.03	Answer delay	0~200ms	5	○
F0E.04	Fault time of communication overtime	0.0 (Invalid) 0.1~60.0s	0.0s	○
F0E.05	Transmission fault proccessing	0 : Alarm and stop freely 1 : No alarm and continue to run 2 : No alarm and stop according to the stop mode (Only under the communication control) 3 : No alarm and stop according to the stop mode (Under all control modes)	0	○
F0E.06	Communication processing action selection	0 : Write with response 1 : Write without response	0x0000	○
F0E.07	Interval time send by Master	10ms-5000ms	200ms	○
F0E.08	MODBUS Communication mode selection	0 : Standard RTU mode 1 : Mode 1 2 : Mode 2	0	○

Function code	Name	Setup range	Default Value	Modification
Group A01 A1 Curve Setting Function Group				
A01.00	Lower limit of AI 1	0.00V~ A01.02	0.00V	○
A01.01	Corresponding setting of the lower limit of AI 1	-100.0%~100.0%	0.0%	○
A01.02	Upper limit of AI 1	A01.00~10.00VA01.02	10.00V	○
A01.03	Corresponding setting of the upper limit of AI 1	-100.0%~100.0%	100.0%	○
A01.04	Ai1 input filter time	0.000s~10.000s	0.100s	○
A01.05	Lower limit of AI2	-10.00V~ A01.09	-10.00V	○
A01.06	Corresponding setting of the lower limit of AI2	-100.0%~100.0%	0.0%	○
A01.07	Upper limit of AI2	A01.09~10.00V	10.00V	○
A01.08	Corresponding setting of the upper limit of AI2	-100.0%~100.0%	100.0%	○
A01.09	Middle value of AI2	A01.05~A01.07	0.00V	○
A01.10	Corresponding middle setting ofAI2	-100.0%~100.0%	0.0%	○
A01.11	AI2 input filter time	0.000s~10.000s	0.100s	○
A01.12	Lower limit of AI3	-10.00V~A01.14	0.00V	○
A01.13	Corresponding setting of the lower limit of AI3	-100.0%~100.0%	0.0%	○
A01.14	Upper limit of AI3	A01.12~10.00V	10.00V	○
A01.15	Corresponding setting of the upper limit of AI3	-100.0%~100.0%	100.0%	○
A01.16	Middle value of AI3	A01.12~A01.14	0.00V	○
A01.17	Corresponding middle setting ofAI3	-100.0%~100.0%	0.0%	○
A01.18	AI3 input filter time	0.000s~10.000s	0.100s	○
A01.19	Keypad analog filter time	0.000~10.000s	0.050s	○
A01.20	AI lower than minimum input setting selection	Ones：AI1 lower than minimum input setting selection 1-0.0% Tens：AI2 lower than minimum input setting selection(As above) Hundreds：AI3 lower than minimum input setting selection (As above)	0x000	○

Function code	Name	Setup range	Default Value	Modification
A01.21	AI,AO corrective active selection	0—No action 1—AI1 channel correction 2—AI2 channel correction 3—AI3 channel correction 4—A01 channel correction 5—A02 channel correction	0	○
A01.22	AI1display voltage1	0~10.000	1.000	○
A01.23	AI1 measured voltage1	0~10.000	1.000	○
A01.24	AI1display voltage 2	0~10.000	9.000	○
A01.25	AI1measured voltage2	0~10.000	9.000	○
A01.26	AI2 display voltage1	-10.000~10.000	1.000	○
A01.27	AI2 measured voltage1	-10.000~10.000	1.000	○
A01.28	AI2 display voltage 2	-10.000~10.000	9.000	○
A01.29	AI2 measured voltage 2	-10.000~10.000	9.000	○
A01.30	AI3 display voltage 1	-10.000~10.000	1.000	○
A01.31	AI3 measured voltage 1	-10.000~10.000	1.000	○
A01.32	AI3 display voltage 2	-10.000~10.000	9.000	○
A01.33	AI3 measured voltage 2	-10.000~10.000	9.000	○
A01.34	A01 display voltage 1	0~10.000	1.000	○
A01.35	A01 measured voltage 1	0~10.000	1.000	○
A01.36	A01 display voltage 2	0~10.000	9.000	○
A01.37	A01 measured voltage 2	0~10.000	9.000	○
A01.38	A02 display voltage1	0~10.000	1.000	○
A01.39	A02 measured voltage1	0~10.000	1.000	○
A01.40	A02 display voltage 2	0~10.000	9.000	○
A01.41	A02 measured voltage 2	0~10.000	9.000	○
Group A02 Monitoring Function Group				
A02.00	Setting frequency	0.00Hz~F00.03	0.00Hz	●
A02.01	Output frequency	0.00Hz~F00.03	0.00Hz	●
A02.02	Ramp reference frequency	0.00Hz~F00.03	0.00Hz	●
A02.03	Output voltage	0~1200V	0V	●
A02.04	Output current	0.0~5000.0A	0.0A	●
A02.05	Motor speed	0~65535rpm	0rpm	●
A02.06	Reserved	0	0	●
A02.07	Reserved	0	0	●

Function code	Name	Setup range	Default Value	Modification
A02.08	output power	-300.0~300.0%(the rated current of the motor)	0.0%	●
A02.09	Output torque	-250.0~250.0%(the rated current of the motor)	0.0%	●
A02.10	Evaluated motor frequency	0.00~F00.03	0.00Hz	●
A02.11	DC bus voltage	0.0~2000.0V	0V	●
A02.12	Digital input terminals state	0x00~0xFF	0x00	●
A02.13	Digital output terminals state	0x0~0xF	0x00	●
A02.14	Digital adjustment	0.00Hz~F00.03	0.00Hz	●
A02.15	Torque reference	-300.0%~300.0% (the rated current of the motor)	0.0%	●
A02.16	Linear speed	0~65535	0	●
A02.17	Length value	0~65535	0	●
A02.18	Counting value	0~65535	0	●
A02.19	AI1 input voltage	0.00~10.00V	0.00V	●
A02.20	AI2 input voltage	10.00~10.00V	0.00V	●
A02.21	AI3 input voltage	-10.00~10.00V	0.00V	●
A02.22	HDI1input frequency	0.00~50.00kHz	0.00kHz	●
A02.23	PID reference	-100.0~100.0%	0.0%	●
A02.24	PID feedback	-100.0~100.0%	0.0%	●
A02.25	PID output	-100.0~100.00%	0.00%	●
A02.26	Power factor of the motor	-1.00~1.00	0.0	●
A02.27	Current running time	0~65535min	0m	●
A02.28	Simple PLC and the current step of the multi-step speed	0~15	0	○
A02.29	ASR controller output	-300.0%~300.0% (the rated current of the motor)	0.0%	●
A02.30	AO1 Output	0-10.00V	0	●
A02.31	AO2 Output	0-10.00V	0	●
A02.32	AC current	0.0~5000.0A	0.0A	●
A02.33	Output torque	-3000.0Nm~3000.0Nm	0.0Nm	●
A02.34	Count value of motor overload	0~100 (100 report E.OPL1 fault)	0	●
A02.35	Copy keypad EEPROM software version	0	0	●
A02.36	Reserved	0	0	●
A02.37	Current motor seletion	1: Current motor 1 2: Current motor 2	1	●

Function code	Name	Setup range	Default Value	Modification
A03 Group DP Parameters				
A03.00	Reserved	0	0	●
A03.01	DP slave address	1~127	1	◎
A03.02	PZD1 Reception	0：no operation 1：Communication setting frequency (0~Fmax (Unit：0.01Hz)) 2：PID Given value (0~1000，1000对应100.0%) 3：PID feedback (0~1000，1000对应100.0%) 4：Torque setting value (-3000~3000，1000 corresponding 100.0% motor rated current) 5：Forward up limit frequency setting value (0~Fmax (unit：0.01Hz)) 6：Reverse up limit frequency setting valu (0~Fmax (unit：0.01Hz)) 7：Electric torque up limit torque (0~3000，1000 to 100.0% AC drive motor current) 8：Braking torque up limit torque (0~3000，1000 corresponding 100.0% motor rated current) 9：Particular control demand character： Bit0~1：=00：motor1 =01：motor2 =10：motor3 =11：motor4 Bit2：=1 torque control =0：speed control 10：Virtual input terminal command, range：0x000~0x1FF 11：Virtual output terminal command，range：0x00~0x0F 12：Voltage setting value (V/F separation purpose) (0~1000，1000 corresponding 100.0% motor rated voltage) 13：AO output setting value 1 (-1000~1000，1000 corresponding 100.0%) 14：AO output setting value 2 (-1000~1000，1000 corresponding 100.0%) 15：Reserve 16：Factory barcode 1 17：Factory barcode 2 18：Factory barcode 3 19：Factory barcode 4 20：Factory barcode 5 21：Factory barcode 6	0	○
A03.03	PZD2 Reception		0	○
A03.04	PZD3 Reception		0	○
A03.05	PZD4 Reception		0	○
A03.06	PZD5 Reception		0	○
A03.07	PZD6 Reception		0	○
A03.08	PZD7 Reception		0	○
A03.09	PZD8 Reception		0	○
A03.10	PZD9 Reception		0	○
A03.11	PZD10 Reception		0	○
A03.12	PZD11 Reception		0	○
A03.13	PZD12Reception		0	○
A03.14	PZD1 sending	0：running frequency(Hz on) 1：setting frequency(Hz blinking) 2：Bus voltage(V on) 3：output voltage (V on) 4：output current (A on) 5：running rotational speed (rpm on) 6：output frequency(%on) 7：output torque (%on) 8：PID given value(%on) 9：PID feedback value (%on) 10：input terminal status	0	○
A03.15	PZD2 sending		0	○
A03.16	PZD3 sending		0	○
A03.17	PZD4 sending		0	○

Function code	Name	Setup range	Default Value	Modification
A03.18	PZD5 sending	11 : output terminal state 12 : torque setting value (%on) 13 : Pulse count 14 : Length value 15 : PLC current stage 16 : Multi-speed current stage 17 : Analog AI1 value(on) 18 : Analog AI2 value(on) 19 : Analog AI3 value(on) 20 : high speed pulse HDI frequency 21 : motor overload percentage(%on) 22 : AC drive overload percentage (%on) 23 : slope frequency given value (Hz on) 24 : linear speed 25 : AC line current 26 : Communication setting frequency 27 : PID Given 28 : PID feedback 29 : Torque setting value 30 : Forward up limit frequency setting value 31 : Reverse up limit frequency setting value 32 : Electric torque up limit torque 33 : Braking torque up limit torque 34 : Particular control command character : 35 : Analog input terminal command 36 : Analog output terminal command 37 : Voltage setting value (V/F separation) 38 : AO output setting value 1 39 : AO output setting value 2 40 : Reserve 41 : Running frequency at current fault 42 : Slope given frequency at current fault 43 : Output voltage at current fault 44 : Output current at current fault 45 : Bus voltage at current fault 46 : Max temperature at current fault 47 : Input terminal status at current fault 48 : Output terminal status at current fault 49 : Factory barcode 1 50 : Factory barcode 2 51 : Factory barcode 3 52 : Factory barcode 4 53 : Factory barcode 5 54 : Factory barcode 6	0	○
A03.19	PZD6 sending		0	○
A03.20	PZD7 sending		0	○
A03.21	PZD8 sending		0	○
A03.22	PZD9 sending		0	○
A03.23	PZD10 sending		0	○
A03.24	PZD11 sending		0	○
A03.25	PZD12 sending		0	○

Chapter 6

Parameter Description

The Content of This Chapter

This chapter lists the function code table, and give a brief description of the function code table.

Group F00 Basic Function Group

Function code	Name	Setup range	Default Value	Modification
F00.00	Motor 1 control mode	0~1	1	◎

0: V/F Control Mode :
It suitable for the less load demanding occasion, for example, fans and pumps load. It canbe used for Single one AC drive to drive several motors or the applications in which the motor parameter auto-tuning function cannot operated, or other cases.

1: Vector control 0 mode
Low frequency, high torque output, strong load adaptability, one AC drive is used to drive multiple motors; need to obtain exact motor parameters by auto-tuning function.

Function code	Name	Setup range	Default Value	Modification
F00.01	Run command channel	0~4	0	○

Select the run control command of the AC drive channel. The control command of the AC drive includes: Start-up, stop, forward, reverse, jogging and fault reset.

0 : Keypad running command channel (“LOCAL/REMOT” light off)
Carry out command control by RUN, STOP / RST on the keypadl. Set the multi-functionl key S set to FWD / REV shifting function (F07.01 = 3)to change the running direction; press RUN and STOP / RST simultaneously in running state to make the AC drive coast to stop.

1 : Terminal running command channel (“LOCAL/REMOT” ON)
Carry out the running command control by the forward rotation, reverse rotation and forward jogging and reverse jogging of the multi-function terminals, the Keypad STOP invalid.

2 : Terminal running command channel (“LOCAL/REMOT” is ON)
Carry out the running command control by the forward rotation, reverse rotation and forward jogging and reverse jogging of the multi-function terminals, the Keypad STOP valid.

3 : Communication run command channel (“LOCAL/REMOT” is FLASH)
The running command is controlled by the upper monitor via communication , the Keypad STOP invalid.

4 : Communication running command channel (“LOCAL/REMOT” is FLASH)
The running command is controlled by the upper monitor via communication, the Keypad STOP valid.

Function code	Name	Setup range	Default Value	Modification
F00.02	Communication run command channel selection	0~2	0	○

0 : MODBUS communication channel

1 : CAN communication channel

2 : Profibus-DP communication channel

Note: 1、2 is extension functions which need corresponding extension card.

Function code	Name	Setup range	Default Value	Modification
F00.03	Max output frequency	F00.04~600.00Hz	50.00Hz	◎

This parameter is used to set the maximum output frequency of the AC drive. User should pay attention to this parameter because it is the foundation of the frequency setting and the speed of acceleration and deceleration.

Function code	Name	Setup range	Default Value	Modification
F00.04	Upper limit frequency	F00.05~F00.3 (max. frequency)	50.00Hz	◎

The upper limit of the running frequency is the upper limit of the output frequency of the AC drive which is lower than or equal to the maximum frequency.

The AC drive runs at the upper limit frequency if the set frequency is higher than the upper limit one.

Function code	Name	Setup range	Default Value	Modification
F00.05	Lower limit frequency	0.00Hz~F00.04 (Operating frequency upper limit)	0.00Hz	◎

The lower limit of the running is that of the ouput frequency of the AC drive.

when setting frequency is lower than the lower limit frequency, which is decided by F01.21.

Note:Max. output frequency≥Upper limit frequency≥Lower limit frequency.

Function code	Name	Setup range	Default Value	Modification
F00.06	A frequency command	0~11	0	○
F00.07	A frequency command	0~11	3	○

0 : Keypad
Modify the value F00.11(set the frequency by keypad)to modify the frequency by the keypad.

1 : Keypad potentiometer setting
Set the value of the specified frequency source is set by an analog potentiometer knob on the Keypad, the user operates the potentiometer knob to set and modify the value of the frequency source.

2 : Analog AI1 setting

3 : Analog AI2 setting

4 : Analog AI3 setting
Set the frequency source by analog input terminals. HD500 AC drive provide 3 ways analog input terminals AI1 / AI2 and AI3 as the standard configuration, of which Ai1 is the voltage/current option e (0 ~ 10V / 0 ~ 20mA) which can be shifted by jumpers; while AI2 / Ai3 are voltage input (-10V ~ + 10V).

Note : When analog AI1 select 0 ~ 20mA input, the corresponding voltage of 20mA is10V. 100.0% of the analog input setting corresponds to the maximum output frequency (F00.03) in forward direction and -100.0% corresponds to the maximumoutput frequency in reverse direction(funvtion code F00.03) the details function code refer to group A01 parameters.

5 : High-speed pulse HDI1 setting
The frequency is set by high-speed pulse terminals. HD500 series AC drive provide 1 high speed pulse input as the standard configuration. The pulse frequency range is 0.00 ~ 50.00kHz. 100% of the high speed pulse input setting corresponds to the
maximum output frequency in forward direction (F00.03) and - 100.0% corresponds to the maximum output frequency in reverse direction (F00.03).

Note : The pulse setting can only be input by enter multi-function terminal HDI1. Set F05.00 (HDI1 input selection) to high-speed pulse input, F05.29 (HDI1 high-speed pulse input selection) to frequency setting input."

6 : Simple PLC program setting
The AC drive runs at simple PLC program mode when F00.06 = 6 or F00.07 = 6. Set F0B (simple PLC and multi-steo speed control) to select the running frequency, running direction, ACC/DEC time and the keeping time of corresponding stage. See the function description of F0B for detailed information.

7 : Multi-step speed running setting
The AC drive runs at multi-step speed mode when F00.06 = 7 or F00.07 = 7, set F05 to select the current running stage, and set F0B to select the current running frequency.

Note: The multi-step speed has the priority when F00.06 or F00.07 does not equal to 6、7, but the setting stage can only be the 1 ~ 15 stage. The setting stage is 0 ~15 if F00.06 or F00.07 equal to 7.

8：PID control setting
The running mode of the AC drive is process PID control when F00.06 = 8 or F00.07 = 8. The running frequency of the AC drive is the value after PID effect. See F09 for the detailed information of the given source, given value, feedback source of the PID.

9：MODBUS communication setting.
The frequency is set by the MODBUS communications.See F0E for detailed information.

10：CAN communication setting.
The frequency is set by CAN communication.

11：Profibus-DP communication setting.
Assigned frequency source setting value is decided by Profibus-DP communication.

Note:10、11 is extension functions which need corresponding extension card.

Function code	Name	Setup range	Default Value	Modification
F00.08	B frequency command reference	0：Maximum output frequency 1：A frequency command	0	○

0: Maximum output frequency, 100% of B frequency setting corresponds to the maximum output frequency.

1: A frequency command, 100% of B frequency setting o corresponds to the maximum output frequency. Select this setting and F00.10 if it needs to adjusts on the base of A frequency command.

6

Function code	Name	Setup range	Default Value	Modification
F00.09	B frequency maximum output frequency	0.0~100.0%	100.0%	○

This parameter is the gain coefficient of the source B frequency running results.B frequency source = B frequency source command (percentage) × B frequency command reference object×B frequency source gain coefficient when the user selects B frequency source as the auxiliary frequency source, it can set the auxiliary frequency source affects to set frequency by this parameter setting.

Function code	Name	Setup range	Default Value	Modification
F00.10	Combination of the setting codes	0~5	0	○

0：A, The current frequency setting is A Frequency source.

1 : B, The current frequency setting is B Frequency source.

2 : A+B , The current frequency setting is A Frequency source+ B Frequency source.

3 : A-B , The current frequency setting is A Frequency source - B Frequency source.

4:MAX(A,B),Current frequency setting is the bigger one between A Frequency source B Frequency source.

5:MIN(A,B), Current frequency setting is the smaller one between A Frequency source and B Frequency source.

Note:The combination manner can be shifted by F05 group (terminal function).

Function code	Name	Setup range	Default Value	Modification
F00.11	Keypad setting frequency	0.00 Hz~F00.03 (Max. frequency)	50.00Hz	○

When A and B frequency commands are selected as "keypad settings", the value of the function code is the original setting one of the frequency data of the AC drive .

Function code	Name	Setup range	Default Value	Modification
F00.12	Acc-time 1	0.0~6000.0s	Depend on model	○
F00.13	Dec-time 1	0.0~6000.0s	Depend on model	○

6

ACC time mean the time needed if the AC drive speeds up from 0Hz to the Max. One(F00.03) .

DEC time mean the time needed if the AC drive speeds down from the Max. output to 0Hz frequency (F00.03).

HD500 series define four groups of ACC/DEC time which can be selected by F08. The factor default ACC/DEC time of the AC drive is the first group.

Function code	Name	Setup range	Default Value	Modification
F00.14	Running direction	0~2	0	○

0: Runs at the default direction, the AC drive runs in the forward direction, FWD / REV LED indicator is OFF.

1: Runs at the reverse direction. the AC runs in the reverse direction, FWD / REV LED indicator is ON.

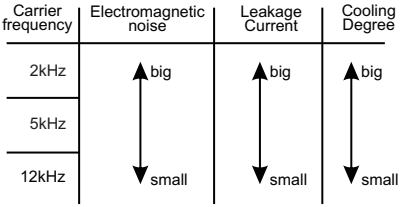
Modify the function code to shift the rotation direction of the motor. This effect equals to the shifting the rotation direction by adjusting either two of the motor lines (U, V, W). The motor rotation direction can be changed by the S key on the keypad. Refer to parameter F07.01.

2 : Forbid to run in reverse direction: It can be used in some special cases if the reverse running is disabled.

Note : When the function parameter come back to the default value, the motor's running direction will come back to the default state, too. In some cases it should be used with caution after commissioning if the change of rotation direction is disabled.

Function code	Name	Setup range	Default Value	Modification
F00.15	Carrier frequency setting	2.0~10.0kHz	Depend on model	○

When A and B frequency commands are selected as "keypad settings", the value of the function code is the original setting one of the frequency data of the AC drive .



The relationship table of the motor type and carrier frequency

Model	Carrier frequency Default
0.7~11KW	5KHz
11~30KW	4KHz
30~75KW	3KHz
More than 75KW	2KHz

The advantages of high carrier frequency: ideal current waveform, little current harmonic wave and motor noise.

The disadvantages of high carrier frequency: increasing the switch loss, increasing AC drive temperature and the impact to the output capacity. The AC drive needs to derate on high carrier frequency. At the same time, the leakage and electrical magnetic interference will increase. Apply low carrier frequency will cause unstable running, torque decreasing and surge.

The the manufacturers has set a reasonal carrier frequency when the AC drive is in factory. In general, users do not need to changethe parameters.

When users use over the default carrier frequency, it need to derating , each additional 1k carrier frequency, it need to derate 10% .

Function code	Name	Setup range	Default Value	Modification
F00.16	Speed track direction setting	0~2	0	◎

0: Forward and reverse can be tracked

1: Fixed forward track

2: Fixed reverse track

F00.16 setting speed track start (F01.00=2) direction judge. In running, motor forward/reverse direction revolve , the setting is 0. When the motor is determined to only forward rotation , it can be set to 1. When the motor is determined to only reverse,it can be set to 2.

Function code	Name	Setup range	Default Value	Modification
F00.17	Motor parameter autotuning	0~2	0	◎

0: No operation

1: Rotation autotuning: Comprehensive motor parameter autotune. It is recommended to use rotation autotuning when high control accuracy is needed.

2: Static autotuning: It is suitable in the cases when the motor can not de-couple from the load. The antotuning for the motor parameter will impact the control accuracy.

Function code	Name	Setup range	Default Value	Modification
F00.18	Function restore parameter	0~2	0	◎

0: No operation

1: Restore the default value

2: Cancel the fault record

Note:Restoring to the default value will cancel the user password, please use this function with caution.

Group F01 Start-up and Stop Control Group

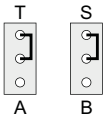
Function code	Name	Setup range	Default Value	Modification
F01.00	Start mode	0~2	0	◎

0 : Star-up directly: start from the starting frequency F01.01.

1 : Star-up after DC braking: start the motor from the starting frequency after DC braking (set the parameter F01.03 and F01.04). and then start the motor at the starting frequency. For closed-loop vector control, the first pre-excitation generated stator flux, and then start the motor running, it can effectively enhance the output and dynamic response on startup.

2 : Start-up after speed tracing : the AC drive automatically track the speed and direction of the motor for rotating the motor in smooth start. Apply to certain high inertia loads with rotation of the occasion when the starter motor rotor, HD500 AC drive hardware detection method using motor speed track, has a wide range of speed track (0 ~ 600Hz), without providing the advantages of other parameters.

Note : When select speed tracking start, the control board T/A, S/B terminal jumper settings set as follows:

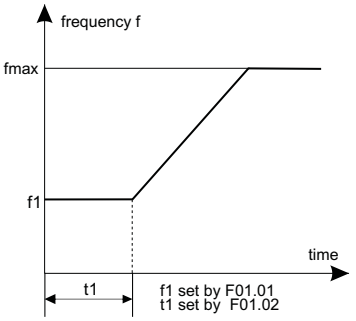


Function code	Name	Setup range	Default Value	Modification
F01.01	Starting frequency of direct start	0.00~10.00Hz	0.50Hz	◎

Setting frequency of direct start-up means the original frequency during the AC drive starting. See F01.02 for detailed information.

Function code	Name	Setup range	Default Value	Modification
F01.02	Retention time of the starting frequency	0.0~100.0s	0.0s	◎

Set a proper starting frequency to increase the torque of the AC drive during starting. During the retention time of the starting frequency, the output frequency of the AC drive is the starting frequency. And then, the AC drive will run from the starting frequency to the set frequency. If the set frequency is lower than the starting frequency,the AC drive will stop running and keep in the stand-by state. The starting frequency is not limited the lower frequency.



Function code	Name	Setup range	Default Value	Modification
F01.03	The braking current before starting	0.0~150.0%	0.0%	◎
F01.04	The braking time before starting	0.0~100.0s	0.0s	◎

The AC drive will carry out DC braking at the braking current set before starting and it will speed up after the DC braking time.If the DC braking is set to o, the DC braking current is carried out according to the preset DC braking current . After setting the DC braking is invalid.

The stronger the braking current, the bigger of the braking power. The DC braking current before starting means the percentage of the rated current of the AC drive.

6

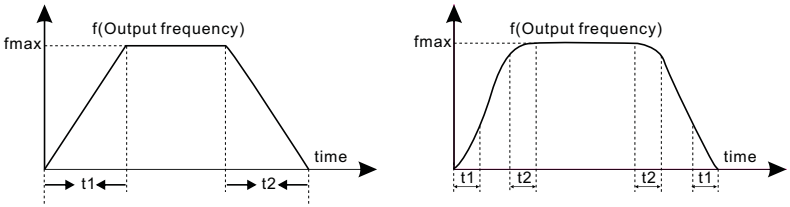
Function code	Name	Setup range	Default Value	Modification
F01.05	ACC/DEC selection	0~1	0	◎
F01.06	S curve start ratio	0.0~50.0% (Acc/Dec time)	30.0%	◎
F01.07	S curve end ratio	0.0~50.0% (Acc/Dec time)	30.0%	◎

F01.05 set starting and running frequency mode selection .

0: line type; the output frequency by line increment or decrement.

1: S curve type; output frequency by increases or decreases according of S curve.

S curve is generally used to relatively flat occasion for the start and stop the process , such as elevators, conveyor belt.



Instruction: t1is the start segment ratio of the S curve,
t2 is the end segment ratio of the S curve.

Function code	Name	Setup range	Default Value	Modification
F01.08	Stop Mode	0~1	0	○

0: Decelerate to stop: after the stop command because valid, the AC drive decelerates to decrease the output frequency, during the set time. When the frequency decrease to 0Hz , the AC drive stop.

1: Coast to stop: after the stop command becomes invalid, the AC drive ceases the output immediately. And the load coasts to stop at the mechanical inertia.

Function code	Name	Setup range	Default Value	Modification
F01.09	Starting frequency of DC braking	0.00~F00.03 (Max. frequency)	0.00Hz	○
F01.10	Waiting time of DC braking	0.00~100.00	0.05s	○
F01.11	Stopping DC braking current	0.0~150.0%	0.0%	○
F01.12	Stopping DC braking time	0.0~100.0s	0.0s	○

The starting frequency of stop braking: the AC drive will carry on stop DC braking when the frequency is arrived during the procedure of decelerating to stop.

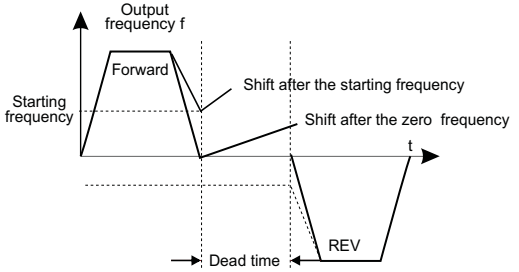
The waiting time of stop braking: before the stop DC braking, the AC drive will close output and begin to carry on the DC braking after the waiting time. This function is used to avoid the overcurrent fault caused by DC braking when the speed is too high.

Stop DC braking current: the DC brake added. The stronger the current, the bigger the DC braking effect.

The braking time of stop braking: the retention time of DC brake. If the time is 0, the DC brake is invalid. The AC drive will stop at the set deceleration time.

Function code	Name	Setup range	Default Value	Modification
F01.13	Dead time of FWD/REV rotation	0.0~6000.0s	0.0s	○

During the procedure of switching FWD/REV rotation, set the threshold by F01.14, which is as the table below:



Function code	Name	Setup range	Default Value	Modification
F01.14	Stopping frequency	0.00~100.00Hz	0.50Hz	○

F01.14 set the AC drive stop speed threshold. Below this value the AC drive to stop running.

6

Function code	Name	Setup range	Default Value	Modification
F01.15	Reserved	Reserved	0	●
F01.16	Reserved	Reserved	0	●

This parameter is Reserved.

Function code	Name	Setup range	Default Value	Modification
F01.17	The protection of theelectric terminals	0: Invalid operation command on terminal 1: valid operation command on terminal	0	○

When the running commands are controlled by the terminal, the system will detect the state of the running terminal during powering on.

0: The terminal running is invalid when powering on. Even the running command is detected to be valid during/powering on, the AC drive won't run and the system keeps in the protection state until the running command is canceled and enabled again.

1: The terminal running command is valid when powering on. If the running command is detected to be valid during powering, the system will start the AC drive automatically after the initialization.

Note: This function should be selected with cautions, or serious result may follow.

Function code	Name	Setup range	Default Value	Modification
F01.18	Select restart after power failure	0 : prohibit restart 1 : allow restart	0	○

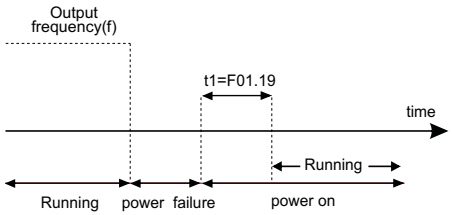
This function can eable the AC drive start or not after the power off and then power on.

0 : Prohibit restart

1 : Allow restart, if the starting need is met, the AC drive will run automatically after waiting for the time defined by F01.19.

Function code	Name	Setup range	Default Value	Modification
F01.19	Restart waiting time	0.0~6000.0s (F01.18 equal to1is valid)	1.0s	○

Valid when F01.18, the function determines the waiting time before the automatic running of the AC drive when powering off and then powering on.



Function code	Name	Setup range	Default Value	Modification
F01.20	Reserved	Reserved	0	●

This parameter is Reserved.

Function code	Name	Setup range	Default Value	Modification
F01.21	Action if running frequency<lower limit frequency(valid>0)	0~2	0	◎

0: Running at lower limit frequency.

1: Stop (Close PWM output)

2: Zero speed operation

Function code	Name	Setup range	Default Value	Modification
F01.22	Reserved	00.0~3600.0s（F01.21 equal to 2 is valid）	0.0s	○

When the AC drive is hibernation state, the set frequency is above the lower limit one again and it lasts for the time set by F01.22, the AC drive will run automatically.

Group F02 Motor 1 Parameter Group

Function code	Name	Setup range	Default Value	Modification
F02.00	Load Type	0~1	0	◎

0 : G type (Constant torque /heavyload type load)

1 : P type (Variable torque / lightload type load)

6

Function code	Name	Setup range	Default Value	Modification
F02.01	Motor type 1	0~1	0	◎

0 : General asynchronous motor without independent cooling fans, at low frequencies the cooling effect is poor, it will make the appropriate compensation when AC drive under thermal protection.

1 : The frequency variable asynchronous motor have independent cooling fan and don't need low frequency compensation.

Function code	Name	Setup range	Default Value	Modification
F02.02	Rated power of motor 1	0.1~1000.0kW	Depend on model	◎
F02.03	Rated voltage of motor 1	0~1200V	Depend on model	◎
F02.04	Rated current of motor 1	0.8~6000.0A	Depend on model	◎

Function code	Name	Setup range	Default Value	Modification
F02.05	Rated frequency of motor 1	0.01Hz~F00.03 (Maximum)	50.00Hz	○
F02.06	Rated speed of motor1	1~36000rpm	Depend on model	○

The function parameter is used to set the asynchronous motor nameplate parameters. Regardless use the V/F control or vector control, in order to ensure the performance of control, it must be in accordance with the asynchronous motor nameplate parameter and set to the correct F02.02~F02.06 value. In addition, please be noted that, if the power of motor and AC drive standard fitness machine, the distribution power gap is too large (over two files of the power), that the control performance of the AC drive will significantly decreased as well.HD500 provides parameter auto-tuning function. Accurate parameter auto-tuning depends on proper setting of the motor nameplate parameters.

Note:Reset the motor rated power (F02.02), you can initialize F02.0~F02.11 motor parameters.

Function code	Name	Setup range	Default Value	Modification
F02.07	Stator resistance of motor 1	0.001~65.535Ω	Depend on model	○
F02.08	rotor resistance of motor 1	0.001~65.535Ω	Depend on model	○
F02.09	leakage inductance of motor 1	0.1~6553.5mH	Depend on model	○
F02.10	Mutual inductance of motor 1	0.1~6553.5mH	Depend on model	○
F02.11	Non-load current of motor 1	0.1~6553.5A	Depend on model	○

F02.07 ~ F02.11 is asynchronous motor 1 identification parameters, these parameters are not showed in general motor nameplate, they need to obtain from AC drive's auto-tuning on motor parameters. Dynamic auto-tuning can acquire F02.07~F02.15 all the parameters, static auto-tuning only get 3 parameters of F02.07~F02.09 ,the other parameters remain the factory default value.

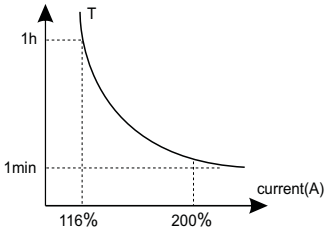
Function code	Name	Setup range	Default Value	Modification
F02.12 ~24	Reserved	0	0	●

F02.12-24 parameters are reserved.

Function code	Name	Setup range	Default Value	Modification
F02.25	Motor 1 overload protection selection	0~1	1	◎
F02.26	Motor 1 overload protection coefficient	50.0~120.0%	100.0%	○

F02.25 set effectiveness of motor 1 overload protection.

Motor 1 overload protection curve is inverse curves, motor 1 electrical overload=F02.26xmotor 1 rated current. When the actual load current <110%xMotor 1 ov-erload current, overload protection invalid; when the actual load current=116%xMotor 1 overload current for 1 hour then report overload fault; when the actual load current = 200%x motor 1 overload current for 1 min reports overload protection. Overload factor is larger, the report contained over shorter time to failure, overload curves shown in the following figure:



Group F04 V/F Control Group

Function code	Name	Setup range	Default Value	Modification
F04.00	Motor 1V / F curve setting	0~5	0	◎

0 : Straight line V/F curve

1 : Multi-dots V/F curve

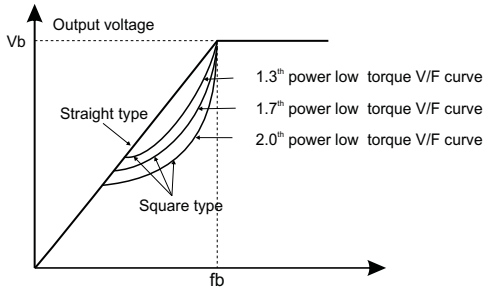
2 : 1.3th power low torque V/F curve

3 : 1.7th power low torque V/F curve

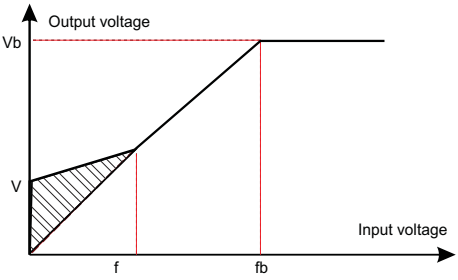
4 : 2.0th power low torque V/F curve

5 : Customized V/F(V/F separation)

The various type of curves as shown in below, Vb in the below picture is the motor rated voltage and fb is the motor rated frequency.



Function code	Name	Setup range	Default Value	Modification
F04.01	Torque boost of motor 1	0.0% (automatic torque boost) 0.1%~20.0%(Manual torque boost)	0.0%	○
F04.02	Torque boost close of motor 1	0.0%~50.0% (Relative motor 1 rated frequency)	20.0%	○



Torque boost to the output voltage for the features of low frequency torque. F04.01 is for the percentage of the rated motor voltage Vb. In practical application, torque boost should be selected according to the load. The bigger the load is, the bigger the boost is. Too bigger torque is inappropriate because the motor will run with over-magnetic,and the current of the AC drive will increase to raise the temperature of the AC drive and decrease the efficiency.

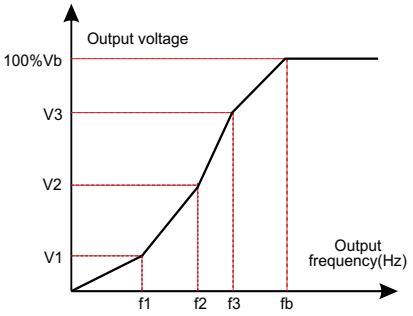
When the torque boost is set to 0.0%, the AC drive is automatic torque boost, and AC drive interior will according to the motor stator resistance value and the actual running current to make compensation for stator resistance voltage.

F04.02 define a manual cut-off frequency of torque boost is relative to percentage of the motor rated frequency fb. Torque boost threshold: under the threshold, the torque boost is valid, but over the threshold, the torque boost is invalid.

Function code	Name	Setup range	Default Value	Modification
F04.03	V/F frequency 1 of motor 1	0.00Hz~F04.05	0.00Hz	○
F04.04	V/F Voltage 1 of motor 1	0.0%~100.0% (motor1 rated voltage)	00.0%	○
F04.05	V/F frequency 2 of motor 1	F04.03~F04.07	0.00Hz	○
F04.06	V/F Voltage 2 of motor 1	0.0%~100.0% (motor1 rated voltage)	00.0%	○
F04.07	V/F frequency 3 of motor 1	F04.05~F02.02 (motor1 rated frequency)	0.00Hz	○
F04.08	V/F Voltage 3 of motor 1	0.0%~100.0% (motor1 rated voltage)	00.0%	○

When F04.00 =1(multi-point V/F curve), the user can set V/F curve through F04.03~F04.08.V/F is generally according to the load of the motor.

Note:V1<V2<V3, f1<f2<f3.Too high low frequency voltage will heat the motor excessively or cause damage. The AC drive may install when overcurrent of overcurrent protection.



Function code	Name	Setup range	Default Value	Modification
F04.09	V/F slip compensation on gain of motor 1	0.0~200.0%	100.0%	○

The function code is used to compensate the change of the rotation speed caused by load during compensation V/F control to improve the rigidity of the motor.It can be set to rated slip frequency of the motor which is counted as below:

$$\triangle f = f_b - n \times p/60$$

Note : fb is the rated frequency of the motor, its function code is F02.05. n is the rated rotating speed of the motor and its function code is F02.06. p is the pole pair of the motor. 100% corresponds to the rated slip frequency △f.

Function code	Name	Setup range	Default Value	Modification
F04.10	Vibration control factor at low frequency of motor 1	0~30	2	○
F04.11	Vibration control factor at high frequency of motor 1	0~30	2	
F04.12	Vibration control threshold of motor 1	0.00Hz~F00.03 (max. frequency)	30.00Hz	○

In V/F control mode, current fluctuation may occur to the motor at some frequency, especially the motor with big power. The motor can not run stably or overcurrent may occur. These phenomena can be canceled by adjusting this parameter.

6

Function code	Name	Setup range	Default Value	Modification
F04.13	Motor 2 V/F curve setting	0.0~200.0%	0	◎

0 : Straight line V/F curve

1 : Multiple-dots V/F curve

2 : 1.3th power low torque V/F curve

3 : 1.7th power low torque V/F curve

4 : 2.0th power low torque V/F curve

5 : Customized V / F (V/F Separation)

Function code	Name	Setup range	Default Value	Modification
F04.14	Torque boost of motor 2	0.0% (automatic torque boost) 0.1%~20.0%	0.0%	○
F04.15	Torque boost close of motor 2	0.0%~50.0% (relative to motor rated frequency)	20.0%	○
F04.16	V/F frequency 1 of motor 2	0.00Hz~F04.18	0.00Hz	○
F04.17	V/F voltage 1 of motor 2	0.0%~100.0% (motor 2 rated voltage)	00.0%	○
F04.18	V/F frequency 2 of motor 2	F04.16~F04.20	00.00Hz	○
F04.19	V/F voltage 2 of motor 2	0.0%~100.0% (motor 2 rated voltage)	00.0%	○
F04.20	V/F frequency 3 of motor 2	F04.18~F0D.06 (motor 2 rated frequency)	00.00Hz	○
F04.21	V/F voltage 3 of motor 2	0.0%~100.0% (motor 2 rated voltage)	00.0%	○
F04.22	V/F slip compensation gain of motor 2	0.0~200.0%	100%	○
F04.23	Vibration control factor at low frequency of motor 2	0~30	2	○
F04.24	Vibration control factor at high frequency of motor 2	0~30	2	○
F04.25	Vibration control threshold of motor 2	0.00Hz~F00.03 (max. frequency)	30.00Hz	○

The above function of the Motor 2 have similar meanings with motor 1 parameters, it can refer to the parameters of the motor 1 described.

6

Function code	Name	Setup range	Default Value	Modification
F04.26	Energy-saving operation	0~1	0	◎

0: No operation

1: Automatic energy-saving operation

Motor will automatically adjust the output voltage to save energy when light loads.

Function code	Name	Setup range	Default Value	Modification
F04.27	Voltage setting	0~9	0	○

F04.27 voltage setting channel selection definition table

Function setting	Function Definition	Function setting	Function Definition
0	Keypad: the output voltage is determined by F04.28	1	AI1 setting voltage

Function setting	Function Definition	Function setting	Function Definition
2	AI2 setting voltage	3	AI3 setting voltage
4	HDI1 setting voltage	5	Multi-setp setting voltage(setting value is determined by F0B set of parameters of multi-speed)
6	PID setting voltage	7	MODBUS communication setting voltage
8	CAN communication setting voltage	9	Profibus-DP communication setting voltage

Note: 100.0% corresponds to the rated voltage of the motor. 8、9 is the extension function, used with card.

Function code	Name	Setup range	Default Value	Modification
F04.28	Keypad setting voltage	0.0%~100.0%	100.0%	○

W The function code is the voltage displaying when the voltage is set through keypad (F04.27=0).

Function code	Name	Setup range	Default Value	Modification
F04.29	Voltage increasing time	0.0~6000.0s	5.0s	○
F04.30	Voltage decreasing time	0.0~6000.0s	5.0s	○

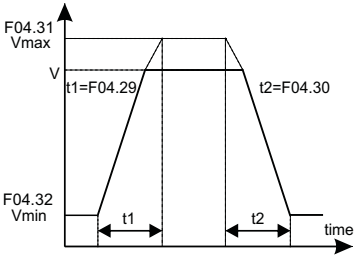
Voltage increasing time is the time when the AC drive accelerates from the output maximum voltage.

Voltage decreasing time is the time when the AC drive decelerates from the output maximum voltage to the output minimum voltage.

Function code	Name	Setup range	Default Value	Modification
F04.31	Maximum output voltage	F04.32~100.0% (the rated voltage of the motor)	100.0%	◎
F04.32	Minimum output voltage	0.0%~F04.31 (the rated voltage of the motor)	0.0%	◎

Set the upper and lower limit of the output voltage.

F The setting range of F04.31 : F04.32~100.0% (the rated voltage of the motor).



Function code	Name	Setup range	Default Value	Modification
F04.33	AVR function selection	0~1	1	○

0: Invalid

1: Valid in the whole process

This parameter sets the AVR function, when the AVR is enable, when the input voltage of the power grid changes, the AC drive will automatically adjust to maintain constant output voltage.

Function code	Name	Setup range	Default Value	Modification
F04.34	Reserved	0	0	●

This parameter is Reserved.

Group F05 Input Terminal Group

Function code	Name	Setup range	Default Value	Modification
F05.00	HDI1 input selection	0~1	0	◎

0: HDI1is high pulse input (see F05.29 ~ F05.34)

1 : HDI1 is digital input (see F05.08)

Function code	Name	Setup range	Default Value	Modification
F05.01	DI1 terminals function selection	0~63	1	◎
F05.02	DI2 terminals function selection		4	◎
F05.03	DI3 terminals function selection		7	◎
F05.04	DI4 terminals function selection		0	◎
F05.05	DI5 terminals function selection		0	◎
F05.06	DI6 terminals function selection(extension card function)		0	◎
F05.07	DI7 terminals function selection(extension card function)		0	◎
F05.08	HDI1 terminal function selection		0	◎

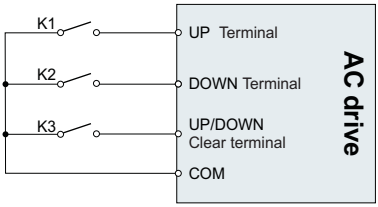
Input Terminal Function Selection Definition Table

Function setting	Function Definition	Function setting	Function Definition
0	No function	1	Forward rotation operation
2	Reverse rotation operation	3	3-wire control operation
4	Forward jogging	5	Reverse jogging
6	Coast to stop	7	Fault reset
8	Operation Pause	9	External fault input
10	Increase frequency setting(UP)	11	Decrese frequency setting(DOWN)
12	frequency setting Clear	13	shift between A setting and B setting
14	shift between combination setting and A	15	Shift between combination setting and B setting
16	Multi-step speed terminal 1	17	Multi-step speed terminal 2
18	Multi-step speed terminal 3	19	Multi-step speed terminal 4

Function setting	Function Definition	Function setting	Function Definition
20	Multi-step speed pause	21	Dec /Acc time 1
22	Dec/ Acc time2	23	Simple PLC stop reset
24	Simple PLC pause	25	PID control pause
26	Traverse pause(stop at the current freuqency)	27	Traverse reset(return to the center frequency)
28	Counter reset	29	timer reset
30	Dec/Acc disabling	31	counter input
32	Length reset	33	Cancel the frequency change setting temporarily
34	DC brake	35	shift the motor 1 to motor 2
36	Shift the command to the keypad	37	Shift the command to the terminal 1
38	Shift the command to the terminal 2	39	Shift the Command to the communication1
40	Shift the Command to the communication2	41	Reserved
42	PID Parameters Switching	43	External terminal stop (equal to keypad STOP)
44	PID second digital given switching terminal		

Terminal Function Explained in Details

Setting Value	Function	Instruction
0	No function	Even if there is a signal input , the AC drive remain the same. Unused terminal was set to NO Function to prevent the wrong action.
1	Forward rotation operation	Through the external terminal to control the AC drive forward and reverse running.
2	Reverse rotation operation	
3	3-wire control operation	Through this terminal to determine the AC drive is three line control mode. The detailed instructions please refer to F05.12 Three wire control mode function code.
4	Forward jogging	Jogging frequency, jogging acceleration and deceleration time d please refer to F08.06, F08.07 and F08.08.
5	Reverse jogging	
6	Coast to stop	AC drive without output, the motor is not controlled by the AC drive. For the large inertia load and no requirements for the stopping time adopts this method.
7	Fault reset	Same function with the Keypad on the STOP/RESET reset and used to achieve remote fault reset.
8	Operation Pause	The AC drive deceleration stop, but all the operating parameters are memory state. Such as, PLC parameters, the frequency of the swing parameters and PID parameters. This signal disappe-ars, the AC drive resume to the previous state before the stop.
9	External fault input	When the external fault signal sent to the AC drive, the AC drive display fault and shut down.

<table>
<tr><th>Setting Value</th><th>Function</th><th>Instruction</th></tr>
<tr><td>10</td><td>Increase frequency setting(UP)</td><td rowspan="3">By the external terminal given frequency to modify the frequency increase and decrease instruction.
 
</td></tr>
<tr><td>11</td><td>Decrese frequency setting(DOWN)</td></tr>
<tr><td>12</td><td>frequency setting Clear</td></tr>
<tr><td>13</td><td>shift between A setting and B setting</td><td>This function can achieve the shift between A frequency given and B frequency given channel.</td></tr>
<tr><td>14</td><td>shift between combination setting and A</td><td>This function can achieve the shift between the combination of the F00.10 settings set channel and A frequency given channel.</td></tr>
<tr><td>15</td><td>Shift between combination setting and B setting</td><td>This function can achieve the shift between the combination of the F00.10 settings set channel and B frequency given channel.</td></tr>
<tr><td>16</td><td>Multi-step speed terminal 1</td><td rowspan="4">Through the combination of the four terminals digital state can achieve 16 speed settings.
Note: Multi segment speed terminal 1 is low-order, multi segment speed terminal 4 is high-order.
<table><tr><td>MS terminal 4</td><td>MS terminal 3</td><td>MS terminal 2</td><td>MS terminal 1</td></tr><tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr></table></td></tr>
<tr><td>17</td><td>Multi-step speed terminal 2</td></tr>
<tr><td>18</td><td>Multi-step speed terminal 3</td></tr>
<tr><td>19</td><td>Multi-step speed terminal 4</td></tr>
<tr><td>20</td><td>Multi-step speed pause</td><td>Shielding multi segment speed select terminal function, so that the set value is maintained in the current state.</td></tr>
<tr><td>21</td><td>Dec /Acc time 1</td><td rowspan="2">Through the combination of these two terminals to select 4 groups of acceleration and deceleration time:
<table><tr><th>Terminal 2</th><th>Terminal 1</th><th>Dec/Acc time selection</th><th>Correspondence parameters</th></tr><tr><td>OFF</td><td>OFF</td><td>Dec and Acc time 1</td><td>F00.12/F00.13</td></tr><tr><td>OFF</td><td>ON</td><td>Dec and Acc time 2</td><td>F08.00/F08.01</td></tr><tr><td>ON</td><td>OFF</td><td>Dec and Acc time 3</td><td>F08.02/F08.03</td></tr><tr><td>ON</td><td>ON</td><td>Dec and Acc time 4</td><td>F08.04/F08.05</td></tr></table></td></tr>
<tr><td>22</td><td>Dec/ Acc time2</td></tr>
<tr><td>23</td><td>Simple PLC stop reset</td><td>Restart the simple PLC process, clear the previous PLC state memory information.</td></tr>
<tr><td>24</td><td>Simple PLC pause</td><td>PLC suspend during the process, and keep running at current speed, after the revocation of the function, the simple PLC continue to run.</td></tr>
<tr><td>25</td><td>PID control pause</td><td>PID temporary failure, the AC drive maintain the current frequency output.</td></tr>
</table>

Setting Value	Function	Instruction
26	Traverse pause(stop at the current freuqency)	AC drive suspended in the current output, after the revocation of the function that continue to operate at the current frequency.
27	Traverse reset(return to the center frequency)	AC drive setting frequency come back to center frequency.
28	Counter reset	The counter state is cleared.
29	timer reset	the actual running time is cleared.
30	Dec/Acc disabling	To ensure that the AC drive is not affected by external signals (except for the shutdown command), to maintain the current output frequency.
31	counter input	counter pulse input terminal
32	Length reset	The length of the meter is cleared.
33	Cancel the frequency change setting temporarily	When the terminal close, the frequency value of the UP/DOWN can be cleared, and the fixed frequency can be recovered to a certain frequency. When the terminal is off , it return to the frequency value after increase or decrease setting.
34	DC brake	When command is effective, the AC drive immediately starts the DC braking.
35	shift the motor 1 to motor 2	When this function terminal is effective, motor 1 control switch to the motor 2 control.
36	Shift the command to the keypad	when the function terminal is effective, the operation command channel is forced to switch to the Keypad operation command channel, when function terminal is disabled, the command channel is restore to original state.
37	Shift the command to the terminal 1	When the function terminal is effective, the operation command channel is forced to switch to the terminal operation command channel 1 (Similar to the F00.01=1 function). When the function terminal is disabled, the command channel is operated to restore to original state.
38	Shift the command to the terminal 2	When the function terminal is effective, the operation command channel is forced to switch to the terminal operation command channel 2 (Similar to the F00.01=2 function). When the function terminal is disabled, the command channel is operated to restore to original state.
39	Shift the Command to the communication1	When the function terminal is effective, the operation command channel is forced to switch to the terminal operation command channel 1 (Similar to the F00.01=3 function).When the function terminal is disabled, the command channel is operated to restore to original state.
40	Shift the Command to the communication2	When the function terminal is effective, the operation command channel is forced to switch to the terminal operation command channel 2 (Similar to the F00.01=4 function). When the function terminal is disabled, the command channel is operated to restore to original state.
41	Reserved	------
42	PID Parameters Switching	When the terminalis valid, use Group 2 PID; When the terminal is invalid, use Group 1 PID parameters.
43	External terminal stop	External stop signal equal to keypad STOP

Setting Value	Function	Instruction
44	PID second digital given switch	For switching PID second digital given

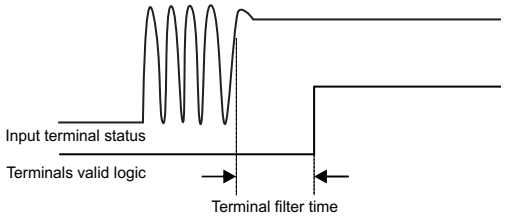
Function code	Name	Setup range	Default Value	Modification
F05.09	Polarity selection of the input terminals	0x00~0xFF	0x00	○

This function code is used to set the polarity of the input terminals.
When the bit is set to a value of 0, the input terminal is positive polarity.
When the value is set to 1,the input terminal is negative polarity.

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
HDI1	DI7	DI6	DI5	DI4	DI3	DI2	DI1

Function code	Name	Setup range	Default Value	Modification
F05.10	ON-OFF filter time	0.000~1.000s	0.010s	○

Setting DI1~DI7, HDI1 terminal sampling filter time. In the large disturbance conditions, this parameter should be increased to prevent misuse.



Function code	Name	Setup range	Default Value	Modification
F05.11	Virtual terminals setting	0~3	0	○

0 : Virtual terminal disabled.

1 : MODBUS communication virtual terminal enabled.

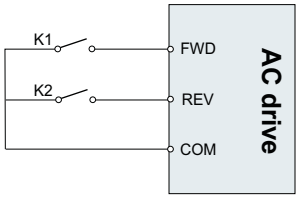
2 : CAN communication virtual terminal is valid

3 : Profibus-DP communication virtual terminal is valid

Function code	Name	Setup range	Default Value	Modification
F05.12	Terminals control running mode	0~3	0	◎

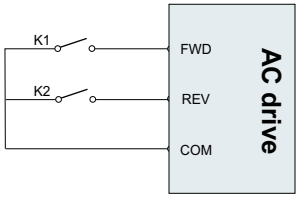
Setting up to the terminal control operation mode.multi function terminal DI setting, 1 as FWD , 2 as REV.

0: Two-line control 1: Enable unity and direction. This mode is the most commonly used two line mode. FWD is forward running command input, REV is reverse running command input.



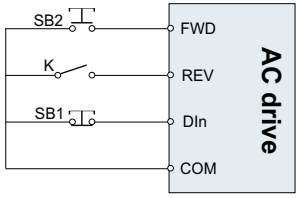
K1	K2	Running command
OFF	OFF	Stop
OFF	ON	Reverse
ON	OFF	Forward
ON	ON	Stop

1: Two-line control 2. It enable the separation and orientation. Using this mode, FWD is running command input, REV is direction control input.



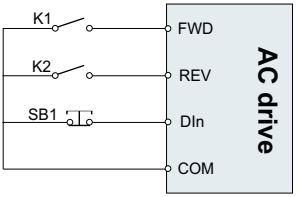
K1	K2	Running command
OFF	OFF	Stop
ON	OFF	Forward
OFF	ON	Stop
ON	ON	Reverse

2: Three-line control 1. The mode DIn is enabled terminal, FWD is run command input, REV is direction control input. In usually, DIn connect to the normally closed button, FWD connect to the normally open button.Shut down command is finished by disconnect with DIN terminal.



SB1	SB2	K	Running command
OFF	XX	XX	Stop
ON	ON	OFF	Forward
ON	ON	ON	Reverse
ON	OFF	XX	Maintain

3: Three-line control 2.Din is enabled terminal, direction is controlled by FWD、REV, but the pulse is valid, when power off, please disconnect Din terminal to finish the process.

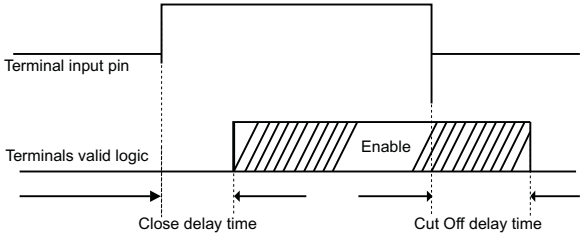


Note:

About the two-line running mode, when theFWD / REV terminal is enabled, stop command generated by other sources leaving the AC drive shutdown, even if control terminal FWD / REV is still enable, the AC drive will not run after shutdown command disappear. If you want the AC drive to run again, you need to trigger FWD / REV. Such as single cycle PLC stop, fixed length control and effective control of the terminal STOP / RST stop (Refer to F07.04).

Function code	Name	Setup range	Default Value	Modification
F05.13	Switch-on delay of DI1 terminal	0.000~50.000s	0.000s	○
F05.14	Switch-off delay of DI1 terminal	0.000~50.000s	0.000s	○
F05.15	Switch-on delay of DI2 terminal	0.000~50.000s	0.000s	○
F05.16	Switch-off delay of DI2 terminal	0.000~50.000s	0.000s	○
F05.17	Switch-on delay of DI3 terminal	0.000~50.000s	0.000s	○
F05.18	Switch-off delay of DI3 terminal	0.000~50.000s	0.000s	○
F05.19	Switch-on delay of DI4 terminal	0.000~50.000s	0.000s	○
F05.20	Switch-off delay of DI4 terminal	0.000~50.000s	0.000s	○
F05.21	Switch-on delay of DI5 terminal	0.000~50.000s	0.000s	○
F05.22	Switch-off delay of DI5 terminal	0.000~50.000s	0.000s	○
F05.23	Switch-on delay of DI6 terminal	0.000~50.000s	0.000s	○
F05.24	Switch-off delay of DI6 terminal	0.000~50.000s	0.000s	○
F05.25	Switch-on delay of DI7 terminal	0.000~50.000s	0.000s	○
F05.26	Switch-off delay of DI7 terminal	0.000~50.000s	0.000s	○
F05.27	Switch-on delay of HDI1 terminal	0.000~50.000s(only F05.00=1 enable)	0.000s	○
F05.28	Switch-off delay of HDI1 terminal	0.000~50.000s(only F05.00=1 enable)	0.000s	○

Function Code defines the programmable input terminal's corresponding delay time during the level changing from the starting period to disconnected.



Function code	Name	Setup range	Default Value	Modification
F05.29	Hdi high-speed pulse input function selection	0~2	0	◎

0 : Frequency setting input

1 : Counter input (Reserved)

2 : Length count input

Function code	Name	Setup range	Default Value	Modification
F05.30	Lower limit frequency of Hdi1	0.00KHz~F05.32	0.00 KHz	○
F05.31	Corresponding setting of lower limit frequency of HDI1	-100.0%~100.0%	0.0%	○
F05.32	Upper limit frequency of HDI 1	F05.30~50.00KHz	50.00 KHz	○
F05.33	Corresponding setting of upper limit frequency of HDI1	-100.0%~100.0%	100.0%	○
F05.34	HDI1 frequency input filter time	0.000s~10.000s	0.100s	○

When the HDI1 high-speed pulse input as a set frequency (F05.29 = 0), F05.30 ~ F05.33 to set receive HDI1 of the upper and lower frequency, and its corresponding maximum frequ-ency (F00.03) percentage.

HDI1 as set frequency in the frequency of A frequency instruction selection (F00.06), and B frequency source used in the instruction selection (F00.07).

Function code	Name	Setup range	Default Value	Modification
F05.35	Reserved	0	0.010s	●

The parameter is Reserved.

Group F06 Output Terminal Group

Function code	Name	Setup range	Default Value	Modification
F06.00	HDO1 output	0~1	0	◎

0 : Open collector pole high speed pulse output (see F06.16 detailed information of the related function)

1 : Open collector poleoutput (seeF06.02 for detailed information of the realated function)

Function code	Name	Setup range	Default Value	Modification
F06.01	DO1 output	0~30	0	○
F06.02	HDO1 output		0	○
F06.03	Relay T1 output		1	○
F06.04	Relay T2 output		5	○

Output Terminal Group

Function setting	Function Definition	Function setting	Function Definition
0	Invalid	1	In operation
2	Forward rotation operation	3	Reverse rotation operation
4	Jogging operation	5	AC drive fault
6	Frequency degree test FDT1	7	Frequency degree test FDT2
8	Frequency arrival	9	Zero-speed running
10	Upper limit frequency arrival	11	Lower limit frequency arrival
12	Ready for operation	13	Pre-Magnetizing
14	Overload pre-alarming	15	Underload per-alarming
16	Completion of Simple PLC stage	17	Completion of Simple PLC Circle
18	Setting count value arrival	19	Defined count value arrival
20	External fault valid	21	Length arrival

Function setting	Function Definition	Function setting	Function Definition
22	Running time arrival	23	MODBUS communications virtual terminal output
24	AC drive is sleeping	25	Profibus-DP communication virtual terminal output
26	Any frequency 1 arrival	27	Any frequency 2 arrival
28~30	reserved		

Output Terminal Detail Introduction

Setting Value	Function	Instruction
0	Invalid	Output terminal without any function
1	In operation	When the AC drive in operation, there is frequency output, output ON signal.
2	Forward rotation operation	When the AC drive in forward operation, there is frequency output, output ON signal.
3	Reverse rotation operation	When the AC drive in reverse operation, there is frequency output, output ON signal.
4	Jogging operation	When the AC drive in jogging operation, there is frequency output, output ON signal.
5	AC drive fault	When the AC drive failure, output ON signal.
6	Frequency degree test FDT1	Reference function code F08.14, F08.13 detailed instructions.
7	Frequency degree test FDT2	Reference function code F08.15, F08.16 detailed instructions.
8	Frequency arrival	Reference function code F08.17 detailed instructions.
9	Zero-speed running	When the AC drive output frequency and the given frequency are zero, output ON signal.
10	Upper limit frequency arrival	When the operating frequency reaches the upper limit frequency, output ON signal.
11	Lower limit frequency arrival	When the operating frequency reaches the lower limit frequency, output ON signal.
12	Ready for operation	The main circuit and control circuit power supply is set, AC drive protection function does not work, when AC drive is in operation state, output ON signal.
13	Pre-Magnetizing	When the transducer is pre-magnetized, output ON signal.
14	Overload pre-alarming	When the AC drive load in the above warning point, and warning time is over, output ON signal. Refer to the function code F0C.08 ~F0C.10 for details.
15	Underload per-alarming	When the AC drive load in the lower warning point, and warning time is over, output ON signal. Refer to the function code F0C.11 ~F0C.13 for details.
16	Completion of Simple PLC stage	When the current phase of the simple PLC complete operation, output signal.
17	Completion of Simple PLC Circle	When the simple PLC complete a cycle, output signal.
18	Setting count value arrival	When the value of the test over F0A.10 set value, output ON signal.

Setting Value	Function	Instruction
19	Defined count value arrival	When the value of the test over F0A.11 set value, output ON signal.
20	External fault valid	When the external fault EF occurs, output ON signal.
21	Length arrival	When the actual length of the test is over the length of the F0A.04 set, output ON signal.
22	Running time arrival	When the total running time of the AC drive over F0A.12 set time , output ON signal.
23	MODBUS communications virtual terminal output	Output signal is set according to the setting value of MODBUS, 1 for ON signal, 0 for OFF signal.
24	AC drive is sleeping	When AC drive is sleeping, ON signal.
25	Profibus-DP communication virtual terminal output	Output corresponding signal according to the Profibus-DP given value, when set as 1, output signal is On, when set as 0, output signal is OFF.
26	Any frequency 1 arrival	Please refer to function code F08.34、F08.35 for details.
27	Any frequency 2 arrival	Any frequency 2 arrival Please refer to function code F08.36、F08.37 for details.
28~30	reserved	------

Function code	Name	Setup range	Default Value	Modification
F06.05	Polarity of output terminals	0x00~0x0F	0x00	○

The function code is used to set the pole of output terminals.

When the current bit is set to 0, the input terminals is positive.

When the current bit is set to 1, the input terminals is negative.

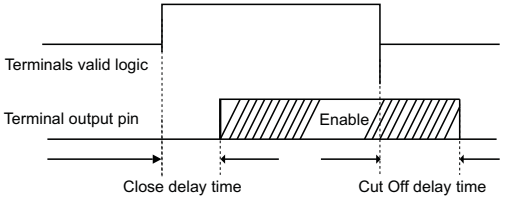
BIT3	BIT2	BIT1	BIT0
T2	T1	HDO1	DO1

Function code	Name	Setup range	Default Value	Modification
F06.06	DO1 switch-on delay time	0.000~50.000s	0.000s	○
F06.07	DO1 switch- off delay time	0.000~50.000s	0.000s	○
F06.08	HDO1 switch-on delay time	0.000~50.000s(only F06.00=1 enable)	0.000s	○
F06.09	HDO1 switch- off delay time	0.000~50.000s(onlyF06.00=1 enable)	0.000s	○
F06.10	T1 switch-on delay time	0.000~50.000s	0.000s	○
F06.11	T1 switch-off delay time	0.000~50.000s	0.000s	○
F06.12	T2 switch-on delay time	0.000~50.000s	0.000s	○

Function code	Name	Setup range	Default Value	Modification
F06.13	Relay T2 switch-off delay time	0.000~50.000s	0.000s	○

Function Code defines the programmable input terminal's corresponding delay time during the level changing from the starting period to disconnected.

Note: F06.08 and F06.09 valid only in F6.00 = 1.



Function code	Name	Setup range	Default Value	Modification
F06.14	AO1 output	0~20	0	○
F06.15	AO2 output		0	○
F06.16	HDO1 output		0	○

The Output Definition Description of Analog Quantity or High Speed Pulse

Function setting	Function Definition	Function setting	Function Definition
0	Running frequency	1	Set frequency
2	Ramp reference frequency	3	Running rotation speed
4	Output current (relative to the rated current of AC drive)	5	Output current (relative to the rated current of the motor)
6	Output voltage	7	Output torque
8	Set torque value	9	Output torque
10	Analog AI1 input value	11	Analog AI2 input value
12	Analog AI3 input value	13	High speed pulse HDI1 input value
14	PID reference	15	PID feedback
16	Modbus communications reference 1	17	Modbus communications reference 2
18	Bus voltage	19	Profibus-DP communication given 1
20	Profibus-DP communication given 2		

The Output Range Description of Analog Quantity or High Speed Pulse

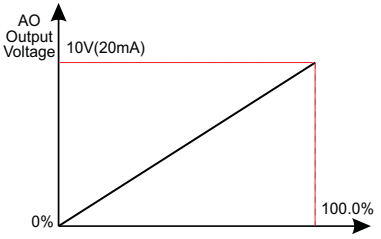
Setting Value	Function	Instruction
0	Running frequency	0~Maximum output frequency(Corresponding to 0~100%)
1	Set frequency	0~Maximum output frequency(Corresponding to 0~100%)
2	Ramp reference frequency	0~Maximum output frequency(Corresponding to 0~100%)
3	Running rotation speed	The motor rated synchronous speed 0~2 times (corresponding to 0~100%)
4	Output current (relative to the rated current of AC drive)	The AC drive rated current 0~2 times (corresponding to 0~100%)
5	Output current (relative to the rated current of the motor)	The motor rated current 0~2 times (corresponding to 0~100%)
6	Output voltage	The AC drive rated voltage 0~1.5 (corresponding to 0~100%)
7	Output torque	The rated power 0~2 times(corresponding to 0~100%)
8	Set torque value	The motor rated current 0~2 times (corresponding to 0~100%)
9	Output torque	The motor rated current 0~2 times (corresponding to 0~100%)
10	Analog AI1 input value	0~10V/0~20Ma(corresponding to 0~100%)
11	Analog AI2 input value	-10V~10V(corresponding to 0~100%)
12	Analog AI3 input value	-10V~10V(corresponding to 0~100%)
13	High speed pulse HDI1 input value	0.00~50.00kHz(corresponding to 0~100%)
14	PID reference	-10V~10V(corresponding to 0~100%)
15	PID feedback	-10V~10V(corresponding to 0~100%)
16	Modbus communications reference 1	0.0%~100.0%(corresponding to 0~100%)
17	Modbus communications reference 2	0.0%~100.0%(corresponding to 0~100%)
18	Bus voltage	The standard bus voltage 0~2 time (corresponding to 0~100%) Standard bus voltage: 311V (220V voltage level) 537V (380V voltage lines)
19	Profibus-DP communication given 1	0.0%~100.0%（corresponding 0~100%）
20	Profibus-DP communication given 2	0.0%~100.0%（corresponding 0~100%）

Function code	Name	Setup range	Default Value	Modification
F06.17	Lower output limit of AO1	-100.0%~F06.19	0.0%	○
F06.18	Corresponding AO1 output of lower limit	-10.00V~10.00V	0.00V	○
F06.19	Upper output limit of AO1	F06.17~100.0%	100.0%	○
F06.20	The corresponding AO1 output of upper limit	-10.00V~10.00V	10.00V	○
F06.21	AO1 output filter time	0.000s~10.000s	0.000s	○
F06.22	Lower output limit of AO2	-100.0%~F06.24	0.0%	○
F06.23	Corresponding AO2 output of lower limit	-10.00V~10.00V	0.0%	○
F06.24	Upper output limit of AO2	F06.22~100.0%	100.0%	○
F06.25	The corresponding AO2 output of upper limit	0.00V~10.00V	10.00V	○
F06.26	AO2 output filter time	0.000~10.000s	0.000s	○
F06.27	Lower output limit of HDO1	0.0%~F06.29	0.0%	○
F06.28	Corresponding HDO1 output of lower limit	0.00~50.00kHz	0.00Hz	○
F06.29	Upper output limit of HDO1	F06.27~100.0%	100.0%	○
F06.30	Corresponding HDO1 output of upper limit	0.00~50.00kHz	50.00 kHz	○
F06.31	HDO1 output filter time	0.000s~10.000s	0.000s	○

The above function codes define the corresponding relationship between the output value and the analog output, when the output value over the external of the setting maximum output or minimum output rang, calculate by the upper limit output or lower output.

The current output is analog output, 1mA is equivalent to 0.5V voltage.

In different applications the 100% of the output value is different from the corresponding analog output, please refer to the above analog or high speed pulse output range table.



Group F07 HMI Group

Function code	Name	Setup range	Default Value	Modification
F07.00	User's password	0~65535	0	○

The password protection will be valid when setting any Non-zero number.

0.0.0.0.0 : Clear the previous user's password, and make the password protection invalid.

After the set user's password becomes valid, if the password is incorrect, users cannot enter the parameter menu.Only correct password can make the user check or modify the parameters. Please remember all users' passwords.

Retreat editing state of the function codes and the password protection will become valid in minute. If the valid password is available, press "PRG" to enter into the editing state of the function codes, and then "0.0.0.0.0" will be displayed. Unless input right password, the operator can not enter into it.

Note : Restoring to the default value can clear the password, please use it with caution.

Function code	Name	Setup range	Default Value	Modification
F07.01	The key of S function selection	0~6	0	◎

0 : No function

1 : Jogging. Press S key to begin the jogging running.

2 : Shift the display state by the shifting key. Press S to shift the displayed function code from right to left.

3 : Shift between forward rotations and reverse rotations. Press S to shift the direction of the frequency commands.This function is only valid in the keypad commands channels.

4 : Clear UP/DOWN settings. Press S to clear the set value of UP/DOWN.

5 : Coast to stop. Press S to coast stop.

6 : Command source switch

Note : Press S key to shift between forward rotation and reverse rotation, the AC drive does not remember the state after shifting during powering off. The AC drive will run in the running direction set according to parameter F00.14 during next powering on.

S key function set as 6:

when F00.01 set as 0, S key command source switch is invalid.

when F00.01 set as 1 or 2(terminal), S key can achieve the switch between terminals and operation panels.

When F00.01 set as 3 or 4(communication), S key can achieve the switch between communication and operation panels.

Function code	Name	Setup range	Default Value	Modification
F07.02	Parameters state 1	0x0000~0xFFFF	0x11	○

The F07.02 Parameter Setting Function Table

Running Status Display Parameter Selection 1			
BIT0	Running frequency (Hz ON)	BIT1	Setting frequency (Hz flickering)
BIT2	Bus voltage (V ON)	BIT3	Output voltage (V ON)
BIT4	Output current (A ON)	BIT5	Runing rotation speed (rpm ON)
BIT6	Output power (% ON)	BIT7	Output torque (% ON)
BIT8	PID reference (% ON)	BIT9	PID feedback (% ON)
BIT10	Input state	BIT11	Output terminal state
BIT12	Torque setting value (% ON)	BIT13	Pulse count value
BIT14	Length value	BIT15	PLC current segment number

Function code	Name	Setup range	Default Value	Modification
F07.03	Parameters state 2	0x0000~0xFFFF	0x0000	○

The F07.03 Parameter Setting Function Table

Running Status Display Parameter Selection 2			
BIT0	The current number of multistage speed	BIT1	AI1(V on)
BIT2	AI2(V on)	BIT3	AI3(V on)
BIT4	HDI frequency	BIT5	Motor overload precentage(% on)
BIT6	The inverter overload percentage(% on)	BIT7	Ramp frequency given value(Hz on)
BIT8	Linear speed	BIT9	AC inlet current(A on)
BIT10	Set rotary speed	BI11	Set linear speed
BIT12	IGBT temperature	BIT13~15	Reserved

Function code	Name	Setup range	Default Value	Modification
F07.04	Parameters for stopping state	0x0000~0xFFFF	0x00FF	○

The F07.04 Parameter Setting Function Table

Stop Status Display Parameter Selection			
BIT0	Set frequency (Hz on, frequency flicking slowly)	BIT1	Bus voltage(V on)
BIT2	Input terminals state	BIT3	Output terminals state
BIT4	PID reference(% flicking)	BIT5	Set rotary speed
BIT6	Ttorque refernece(% on)	BIT7	AI1(V on)
BIT8	AI2(V on)	BIT9	AI3(V on)
BIT10	HDI1 frequency	BIT11	PLC current stage
BIT12	Set linear speed	BIT13	Pulse counters
BIT14	Length value	BIT15	IGBT temperature

Note: Running and stop state display as hexadecimal mode, ones equal to BIT0-BIT3, tens equal to BIT4-BIT7, hundreds to BIT8-BIT11, thousands to BIT12-BIT15, if you want to display one specific parameter, you need to set the BIT as 1, and then input the corresponding hexadecimal number to the parameter, Press the "SHIFT" key for loop display after all the setting.

Example: Displayed as output terminal status, analog AI2, setting linear speed in stopping state, the corresponding BIT3, BIT8, BIT12 is set to 1, the corresponding value is 0001000100001000 (B), hexadecimal is 1108(H) need to be set in F07.04.

Function code	Name	Setup range	Default Value	Modification
F07.05	Frequency coefficient	0.01~20.00	1	○
F07.06	Rotation Speed	0.1~999.9%	100.0%	○
F07.07	Linear speed coefficient	0.1~999.9%	1.0%	○

Display frequency=Running frequency×F07.05.
Mechanical rotation speed=60×running frequency×F07.06/Motor pole pairs.
Linear speed=Mechanical rotation speed×F07.07.

Function code	Name	Setup range	Default Value	Modification
F07.08	Rectifier bridge module temperature	20.0~120.0	----	●
F07.09	Converter module temperature	20.0~120.0	----	●
F07.10	Software version	1.00~655.35	----	●
F07.11	Local accumulative running time	0~65535h	----	●

These parameters only can be viewed not modified.

Function code	Name	Setup range	Default Value	Modification
F07.12	Reserved	0	----	●
F07.13	Reserved	0	----	●

Above parameters are Reserved.

Function code	Name	Setup range	Default Value	Modification
F07.14	Load Type	0 : G type Constant torque load 1 : P type Variable torque load	----	●
F07.15	AC drive rated power	0.4~1000.0kW	----	●
F07.16	AC drive rated voltage	20~1200V	----	●
F07.17	AC drive rated current	0.1~6000.0A	----	●

These parameters only can be viewed not modified.

Function code	Name	Setup range	Default Value	Modification
F07.18	Current fault type	0~38	----	●
F07.19	The 1 times before fault type		----	●
F07.20	The 2 times before fault type		----	●
F07.21	The 3 times before fault type		----	●
F07.22	The 4 times before fault type		----	●
F07.23	The 5 times before fault type		----	●

The above parameters on behalf of the specific fault type, please refer to Chapter 8 AC drive Fault.

Function code	Name	Setup range	Default Value	Modification
F07.24	Running frequency at current fault	----	0.00Hz	●
F07.25	Ramp reference frequency at current fault	----	0.00Hz	●

Function code	Name	Setup range	Default Value	Modification
F07.26	output voltage at the current fault	----	0V	●
F07.27	output current at current fault	----	0.0A	●
F07.28	Bus voltage at current fault	----	0.0V	●
F07.29	The Max. temperature at current fault	----	0.0	●
F07.30	Input terminals state at current fault	----	0	●
F07.31	Output terminals state at current fault	----	0	●

The above parameters record the AC drive internal variable records when current fault occurs, please refer tothe function code of each specific display.

Function code	Name	Setup range	Default Value	Modification
F07.32	Running frequency at previous fault	----	0.00Hz	●
F07.33	Ramp reference frequency at previous fault	----	0.00Hz	●
F07.34	Output voltage at previous fault	----	0V	●
F07.35	The output current at previous fault	----	0.0A	●
F07.36	Bus voltage at previous fault	----	0.0V	●
F07.37	The Max. temperature at previous fault	----	0.0℃	●
F07.38	Input terminals state at previous fault	----	0	●
F07.39	Output terminals state at previous fault	----	0	●

These parameters record the AC drive internal variables at previous, the record of the input and output variables, referring to the function code specific display.

Function code	Name	Setup range	Default Value	Modification
F07.40	Running frequency at previous 2 fault	----	0.0A	●
F07.41	Ramp reference frequency at previous 2 fault	----	0.0V	●
F07.42	Output voltage at previous 2 faults	----	0.0℃	●
F07.43	Output current at previous 2 fault	----	0	●
F07.44	Bus voltage at previous 2 fault	----	0	●
F07.45	The Max. temprature at previous 2 fault	----	0.0℃	●
F07.46	Input terminals state at previous 2 fault	----	0	●
F07.47	Output terminals state at previous 2 fault	----	0	●

The above parameters record internal input and output variables when the 2 times faults occurred, see function code specific display.

Group F08 Strengthen Function Group

Function code	Name	Setup range	Default Value	Modification
F08.00	ACC time2	0.0~6000.0s	Model dependent	○
F08.01	DEC time2	0.0~6000.0s	Model dependent	○
F08.02	ACC time3	0.0~6000.0s	Model dependent	○
F08.03	DEC time3	0.0~6000.0s	Model dependent	○
F08.04	ACC time4	0.0~6000.0s	Model dependent	○
F08.05	DEC time4	0.0~6000.0s	Model dependent	○

HD500 series defines four groups acc/dec time, through the multi-function digital inputs (F05) to choose Acc. and Dec. time. The AC drive Dec and Acc time factory defaults is group 1 time.

Function code	Name	Setup range	Default Value	Modification
F08.06	Jogging frequency	0.00~F00.03 (Max. frequency)	5.00Hz	○

The parameter set the reference frequency of the AC drive in jogging running.

Function code	Name	Setup range	Default Value	Modification
F08.07	Jogging ACC time	0.00~F00.03 (Max. frequency)	Model dependent	○
F08.08	Jogging DEC time	0.00~F00.03 (Max. frequency)	Model dependent	○

The jogging ACC time means the time needed if the AC drive runs from 0hz to the Max frequency (F00.03).

The jogging DEC time means the time needed if the AC drive goes from the Max. Frequency (F0.03) to 0hz.

Function code	Name	Setup range	Default Value	Modification
F08.09	Fault reset times	0~10	0	○
F08.10	Interval time of automatic fault reset	0.1~100.0s	1.0s	○

Fault auto reset times: When the AC drive selects fault auto reset, it used to set the times of auto reset. During unit time, When continue reset exceed this value, the AC drive will report downtime awaiting restoration and calculate the number of times when cannot reset.

Fault auto reset interval: The time interval between the fault and automatic resets.

Function code	Name	Setup range	Default Value	Modification
F08.11	Frequency decreasing ratio of the dropping control	0.00~10.00Hz	0.00Hz	○

When multiple AC drives drive in the same load, AC drives impose different loads, by setting this parameter, allows multiple AC drives to achieve uniform load distribution in the same drive load.

During the decreasing drop control process AC drive will have real time test on the load .The AC drive will reduce the load according to the size and value of the load of this parameter setting to achieve a balance output. F08.11 means the decreasing frequency amount of the rated load.

6

Function code	Name	Setup range	Default Value	Modification
F08.12	Motor shifting	0~3	0	◎

0 : Terminal switch.

1 : MODBUS Communication shifting.

2 : CAN Communication shifting.

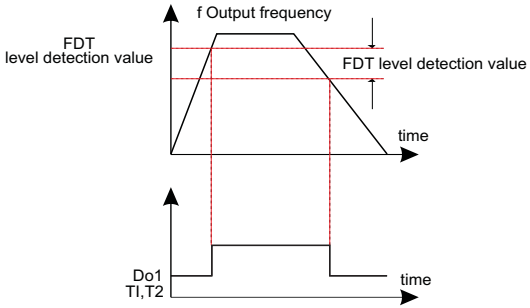
3 : Profibus-DP communication switch

HD500 series supports two motors switching control, the parameter F08.12 is used to select switch channel.

Function code	Name	Setup range	Default Value	Modification
F08.13	FDT1 electrical level detection value	0.00~F00.03 (Max. frequency)	50.00Hz	○
F08.14	FDT1 retention detection value	0.0~100.0% (FDT1electricallevel)	5.0%	○

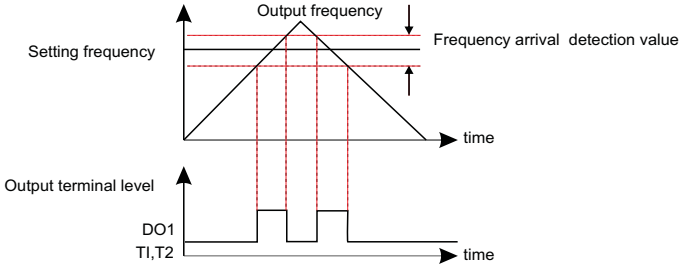
Function code	Name	Setup range	Default Value	Modification
F08.15	FDT2 electrical level detection	0.00~F00.03 (Max. frequency)	50.00Hz	○
F08.16	FDT2 retention detection value	-100.0~100.0% (FDT2 level)	5.0%	○

When the output frequency exceeeds the corresponding frequency of FDT electrical level, the multi-function digital output terminals will output the signal of "frequency level detect FDT" until the output frequency decreases to a value lower than(FDT electrical level-FDT retention detection value)the corresponding frequency, the signal is invalid. Below is the ware form diagram:



Function code	Name	Setup range	Default Value	Modification
F08.17	Frequency arrival detection value	0.0~F00.03 (Max. frequency)	0.00Hz	○

When the output frequency is among the positive or negative detection range of the set frequency, the multi-function digital output terminal will output the signal of "frequency arrival", see the diagram below for detailed information:



Function code	Name	Setup range	Default Value	Modification
F08.18	Energy braking enable	0~1	0	○

This parameter is used to control the internal braking pipe inside the inverter.

0 : Disable

1 : Enable

Note:Only applied to internal Braking unit.

Function code	Name	Setup range	Default Value	Modification
F08.19	Threshold voltage	100.0~2000.0V	220V (380V) 380V (700V)	○

After setting the original bus voltage to brake the energy, adjust the voltage appropriately to brake the load. The factory changes with the voltage level.

Function code	Name	Setup range	Default Value	Modification
F08.20	PWM over commission selection	0~1	1	◎

6

0 : Overmodulation valid

1 : Overmodulation is invalid

Function code	Name	Setup range	Default Value	Modification
F08.21	Keypad data control	0x000~0x1221	0x0000	○
F08.22	Integral ratio of the keypad∧ / ∨	0.01~10.00s	1.0s	○

F08.21 Parameter Setting Function

Keypad digital control set	
LED ones	Frequency enable selection 0 : ∧ / ∨ valid 1 : ∧ / ∨ invalid
LED tens	Frequency control selection 0 : Only valid when F00.06=0 orF00.07=0 setting valid 1 : Valid for all frequency setting manner 2 : Invalid for multi-step speed when multi-step speed has the priority

LED hundreds	Action selection during stopping 0 : Setting is valid 1 : Valid during running, cleared after stopping 2 : Valid during running, cleared after receiving the stop command
LED thousands	∧ / ∨ keys and digital potentiometer integral function 0 : The integral function is valid 1 : The integral function is invalid

Function code	Name	Setup range	Default Value	Modification
F08.23	UP/DOWN terminal control	0x00~0x221	0x0000	○

F08.23 Parameter Setting Function

UP/DOWN terminals control	
LED ones	Frequency control selection 0 : UP/DOWN terminals setting valid 1 : UP/DOWN terminals setting invalid
LED tens	Frequency control selection 0 : Only valid when F00.06=0 orF00.07=0 1 : All frequency means are valid 2 : When the multi-step are priority, it is invalid to the multi-step
LED hundreds	Stop action selection 0 : Setting valid 1 : Valid in the running, clear after stop 2 : Valid in the running, clear after receiving the stop commands

Function code	Name	Setup range	Default Value	Modification
F08.24	UP terminals frequency changing ratio	0.01~50.00s	0.50s	○
F08.25	DOWN terminals frequency changing ratio	0.01~50.00s	0.50s	○

When the above two parameters is valid during the control of the terminal UP/DOWN frequ-ency, set the allowance integral effect, the smaller the value is, the quicker the integral rate.

Function code	Name	Setup range	Default Value	Modification
F08.26	Frequency setting at power loss	0x000~0x111	0x0000	○

F08.26 Parameter Setting Function

Frequency setting at power loss	
LED ones	Action selection when power off 0 : Save when power off 1 : Clear when power off
LED tens	Action selection when MODBUS set frequency off 0: Save when power off 1: Clear when power off
LED hundreds	The action selection when other frequency set frequeny off 0: Save when power off 1: Clear when power off

Function code	Name	Setup range	Default Value	Modification
F08.27	Magnetic flux braking	0~100	0.50s	○

This function code is used to enable4 magnetic flux.

0: Invalid

0~100: Valid

When increase the magnetic flux to decelerate the motor, the energy generated by the motor during braking can be converter into heat energy by increasing the magnetic flux. With this function, decelerating time is shorten while running current is larger. When magnetic flux braking with no actions, motor speed decreasing while the decreasing time is longer.

6

Function code	Name	Setup range	Default Value	Modification
F08.28	Auxiliary Monitoring	0~28	1	○

Supporting function parameters selection instruction

Function setting	Function Definition	Function setting	Function Definition
0	Running frequency	1	Set frequency
2	Bus voltage	3	Output voltage
4	Output current	5	Running rotation speed
6	Output power	7	Output torque
8	PID reference	9	PID feedback
10	Input terminals state	11	Output terminals state
12	Torque setting value	13	Pulse counter value
14	Length value	15	PLC current stage

Supporting function parameters selection instruction

Function setting	Function Definition	Function setting	Function Definition
16	The current number of multi-stage speed	17	AI1 value
18	AI2 value	19	AI3 value
20	HDI1 frequency	21	Motor overload percentage(% on)
22	AC drive overload percentage(% on)	23	Ramp frequency given value(Hz on)
24	Linear speed	25	AC inlet current(A on)
26	Set rotary speed	27	Set linear speed
28	IGBT temperature		

Function code	Name	Setup range	Default Value	Modification
F08.29	Parameter copy selection	0~3	0	◎

0: No operation ;

1 : Control panel parameter upload to the keypad EEPROM ;

2 : Keypad EEPROM parameter download to the control panel and do not download motor parameter;

3 : Keypad EEPROM parameter download to the control panel and download motor parameter;

Note : There must be operate parameter copy in the stop state, it only can be downloaded parameter to the control panel in the same software version and ac drive series ; A02.35 ecords upload reserve keypad parameter version, and depend on the parameter confirm keypad reserve current parameter version whether consistent with control panel.

This is expand function and need to match copy keypad.

Function code	Name	Setup range	Default Value	Modification
F08.30	IO expansion card	0~1	0	○

F08.30 is for IO expansion card selection.

When F08.30=0, IO expansion card is invalid, relative function parameter is invalid.

When F08.30=1, IO expansion card is valid, relative function parameter is valid.(Insert IO expansion card into the control board expansion port)

Function code	Name	Setup range	Default Value	Modification
F08.31	Power failure under voltage decelerate stop	0~1	0	○

0 : invalid;

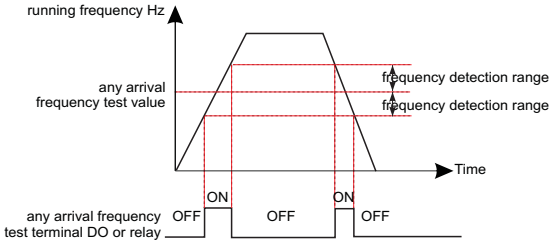
1 : valid.

Function code	Name	Setup range	Default Value	Modification
F08.32	Power failure under voltage decelerate time	0~6000.0 s	0	○
F08.33	Run power failure decelerate cut-off voltage	80~800V	200V (3 phase) / 120V (single phase)	◎

When power failure under voltage in running state, some applications are not allow freedom downtime, increase this parameter to ensure drive quick shutdown when power down . After this function is active, the drive will slow down to stop immediately when power failure in running state. Deceleration time in this state is determined by F08.32. When the bus voltage is lower than F08.33, close PWM to protect the AC drive hardware.

Function code	Name	Setup range	Default Value	Modification
F08.34	Detection time 1 of arbitrary frequency arrival	0~F00.03	50.00Hz	○
F08.35	Detection width 1 of arbitrary frequency arrival	0~100.0%(Max. frequency)	0	○
F08.36	Detection time 2 of arbitrary frequency arrival	0~F00.03	50.00Hz	○
F08.37	Detection width 2 of arbitrary frequency arrival	0~100.0%(Max. frequency)	0	○

When the output frequency in range of the positive and negative detection width of the arbitrary frequency arrival detection value, the multi-function digital output terminal output "arbitrary frequency arrival " signal, the specific waveform as follows:



功能码	名 称	设定范围	出厂值	属性
F08.38	Jogging selection under running situation	0 : Enable 1 : Disable	0	○

Group F09 PID Control Group

Function code	Name	Setup range	Default Value	Modification
F09.00	PID reference source	0~9	0	○

0 : Keypad （F09.01）
1 : AI1
2 : AI2
3 : AI3
4 : HDI1
5 : Multi-step speed set
6 : MODBUS communication set
7 : CAN communication set
8 : Profibus-DP communication setting
9 : Panel potentiometer
Note: Multi-step speed given, it is realized by setting FA group parameters.CAN communication setting need corresponding extension cards.

Function code	Name	Setup range	Default Value	Modification
F09.01	Keypad PID preset	0~100.0%	50.0%	○

When F09.00=0, set the parameter whose basic value is the response value of the system.

Function code	Name	Setup range	Default Value	Modification
F09.02	Keypad feedback source	0~6	0	○

0 : AI1
1 : AI2
2 : AI3
3 : HDI1
4 : MODBUS communication feedback
5 : CAN communication feedback
6 : Profibus-DP communication feedback

Note:The reference and feedback channel can not coincide, otherwise, PID can not control effectively. 5、6 is extension function, please insert appropriate expansion cards.

Function code	Name	Setup range	Default Value	Modification
F09.03	PID output feature	0~1	0	○

0: PID output is positive: When the feedback signal exceeds the PID given value, the output frequency of the AC drive will decrease to balance the PID. For example, the strain PID control during warpup.

1: PID output is negative: When the feedback signal is stronger than the PID given value, the output frequency of the AC drive will increase to balance the PID. For example, the strain PID control during warpdown.

Function code	Name	Setup range	Default Value	Modification
F09.04	Proportional gain(Kp)	0.00~100.00	0.50	○

The function is applied to the proportional gain P of PID input. P determines the strength of the whole PID adjuster. The parameter of 100 means that when the offset of PID feedback and given value is 100%, the adjusting range of PID adjustor is the Max. frequency(ignoring integral and differential function).

Function code	Name	Setup range	Default Value	Modification
F09.05	Intergal time(Ti)	0.00~10.00s	0.20s	○

The parameter integral time(Ti 1) of the set PID controller that determines the PID feedback value and the reference amount of integral regulation speed.

6

When the PID feedback quantity and ration deviation are 100%, integral regulators (Ignore the proportional action and derivative action) through continuous adjustment of the time, the adjust the amount arrive the maximum output frequency (F00.03) or maximum Max voltage (F04.31).The shorter of the integration time adjustment, the greater of the intensity.

Function code	Name	Setup range	Default Value	Modification
F09.06	Differential time(Td)	0.00~10.00s	0.00s	○

This parameter determines the speed of PID adjustor to carry out integral adjustment on the deviation of PID feedback and reference. When the deviation of PID feedback and reference is 100%, the integral adjustor works continuously after the time(ignoring the proportional effect and differential effect) to achieve the Max. Frequency(F00.03) or the Max. Voltage(F04.31). Shorter the integral time, stronger is the adjustment.

Function code	Name	Setup range	Default Value	Modification
F09.07	Sampling cycle(T)	0.00~10.00s	0.10s	○

This parameter means the sampling cycle of the feedback. The adjustor operates each sampling cycle. The longer the sampling cycle is, slower the response is.

Function code	Name	Setup range	Default Value	Modification
F09.08	PID control deviation limit	0.00~10.00%	0.0%	○

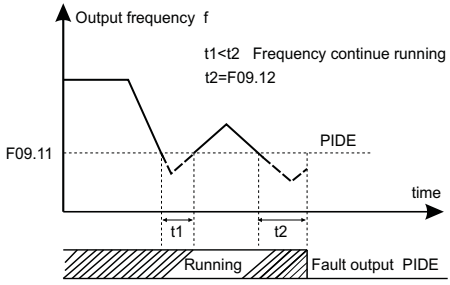
The output of PID system is the maximum deviation relative to close loop reference. As shown in the diagram below, PID adjustor stops to work during the deviation limit. Set the function properly to adjust the accuracy and stability of the system.

Function code	Name	Setup range	Default Value	Modification
F09.09	Output upper limit of PID	F09.10~100.0%(max. frequency or voltage)	0.0%	○
F09.10	Output lower limit of PID	-100.0~F09.09(max. frequency or voltage)	100.0%	○

This parameter is used to set the upper and lower limit of the PID adjustor output.100% corresponds to the max. frequency (F00.03) or the max. voltage of (F04.31).

Function code	Name	Setup range	Default Value	Modification
F09.11	Detection value of feedback offline	0.0~100.0%	0.0%	○
F09.12	Detection time of feedback offline	0.0~3600.0s	1.0s	○

Set the detection value of feedback offline, when the feedback detection value is smaller than or equals to the detected value, and the lasting time exceeds the set value in F09.12, the AC drive will report" PID feedback offline fault" and the keypad will display PIDE.



Function code	Name	Setup range	Default Value	Modification
F09.13	PID adjustment	0x00~0x11	0x0000	○

F09.13 Parameter Setting Function

Frequency setting power failure action selection	
LED ones	0：Keep on integral adjustment when the frequency achieves the upper and low limit; the integration shows the change between the reference and the feedback unless it reaches the internal integral limit. When the trend between the reference and the feedback changes, it needs more time to offset the impact of continuous working and the integration will change with the trend. 1：Stop integral adjustment when the frequency achieves the upper and low limit. If the integration keeps stable, and the trend between the reference and the feedback changes, the integration will change with the trend quickly.
LED tens	0：The same with setting direction; if the output of PID adjustment is different from the current running direction, the internal will output 0 forcedly. 1：Opposite to the setting direction
LED hundreds	0：PID given value cannot adjust by the UP/DOWN key. 1：PID given value can adjust by the UP/DOWN key.
LED thousands	0：When AC drive power off, PID given value set UP/DOWN by will not save. 1：When AC drive power off, PID given value set UP/DOWN by will save.

Function code	Name	Setup range	Default Value	Modification
F09.14	Proportional gain 2(Kp2)	0.00~100.00	0.50	○
F09.15	Integral time(Ti2)	0.00~10.00s	0.2S	○
F09.16	Differential time(Td2)	0.00~10.00s	0.00S	○

Above 3 parameters is the second group for PID control in terms of ratio, integral,differential, the function and meanning is similar to the first group(F09.04,F09.05,F09.06), these 2 groups parameter are switched by F09.17.

Function code	Name	Setup range	Default Value	Modification
F09.17	PID Parameters Switching	0~2	0	◎

This parameter applied to PID 2 groups(Kp1 , Ti1 , Td1 , Kp2 , Ti2 , Td2) switch condition.

0: No switching, only apply the first group parameters F09.04、F09.05、F09.06.

1:Switching according to the deviation between current PID feedback value and given value. Deviation threshold depends on the setting of F09.18;when deviation < F09.18 , please apply to the first groups of F09.04、F09.05、F09.06,when the deviation > F09.18 , please apply to the second groups of F09.14、F09.15.

2: Switching according to the input terminals, when input terminals "PID parameter switching" is OFF,please use the first groups of F09.04、F09.05、F09.06.When hen input terminals "PID parameter switching" is ON, please use the second groups parameters F09.14、F09.15，F09.16.

Function code	Name	Setup range	Default Value	Modification
F09.18	Deviation threshold when PID is switching	0.0%~100.0%	20%	○

WhenF09.17=1，F09.18 is used for setting the deviation threshold value when PID parameters are switching.

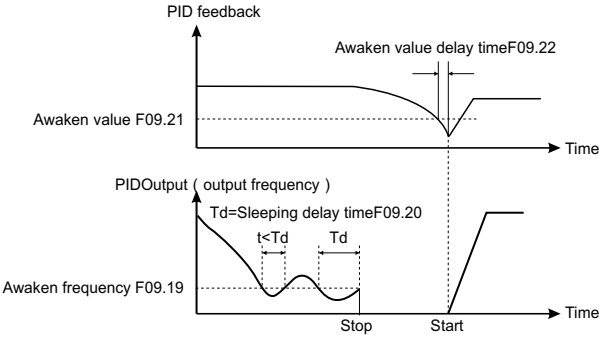
Function code	Name	Setup range	Default Value	Modification
F09.19	PID Hibernate Frequency	0.00~F00.03(Max Frequency)	0.0	○
F09.20	PID Hibernate Delay Time	0.0~3600.0s	30.0s	○

When the PID output frequency is less than the PID Hibernate frequency setted by F09.19, after the PID hibernate delay time setted by F09.20, AC drive will enter into the hibernate status and stop by the way of coasting to stop

Select 24 as the output teminal function(AC drive was in hibernation status), AC drive will come into the hiberation status, Output terminals can be used to output.

Function code	Name	Setup range	Default Value	Modification
F09.21	PID Awaken Value	0.0~100.0%	0.0%	○
F09.22	PID Awaken Value delay time	0.0~60.0s	0.5S	○

When AC drive is in sleeping state, PID feedback value≤（PID given valueXF09.21), with the delay time of PID Awaken Values which is set by F09.22, the AC drive will be awakened and restart.



PID Sleeping/Awaken Diagram

Function code	Name	Setup range	Default Value	Modifi-cation
F09.23	PID Preset Value	0.0~100.0%	0.0%	○
F09.24	PID Preset Value Keeping time	0.0~600.0s	0.0s	○

PID preset value is set to 0, when PID preset value keep running for a period(Preset value keeping time as F09.24),PID begin the adjustment from preset value and PID output is more smooth with this funciton.

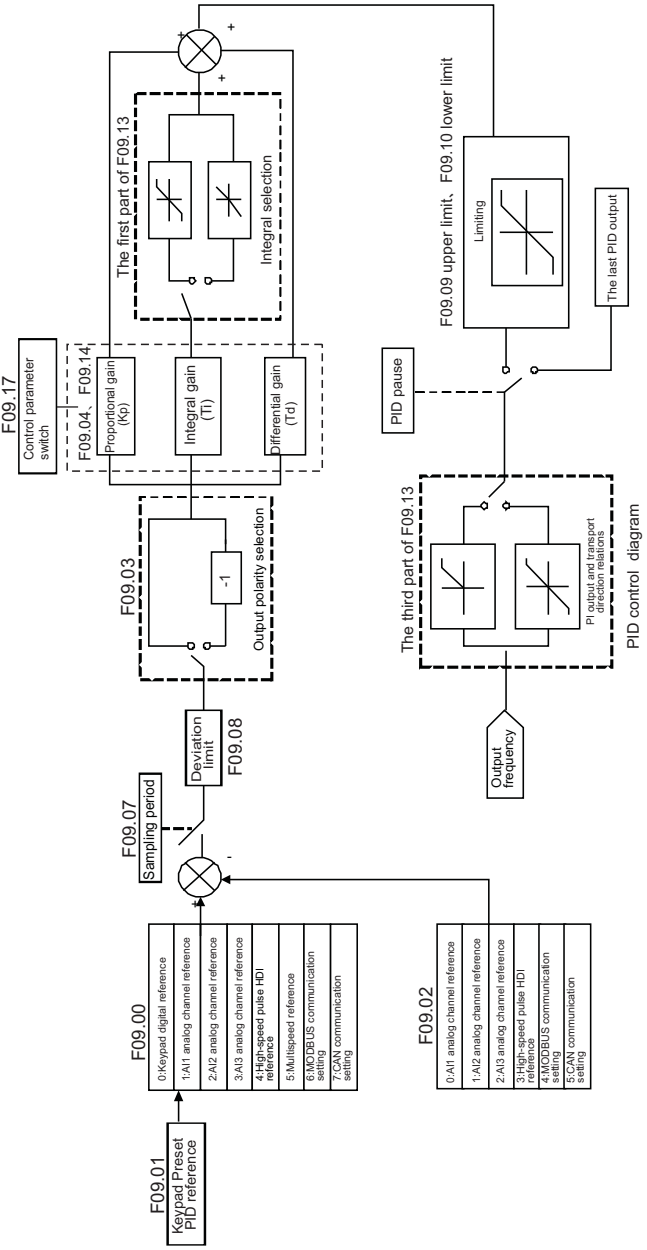
6

功能码	名 称	设定范围	出厂值	属性
F09.25	PID initial value restart valid selection	0: the frequency source is given from other given switching to PID, and the initial value is invalid. 1: the frequency source runs efficiently from other given handover to PID given.	0	○

0: the frequency source is given from other given switching to PID, and the initial value is invalid.
1: the frequency source is given from other given switching to PID, and the initial value is valid

功能码	名 称	设定范围	出厂值	属性
F09.26	PID second digital given	0.0~100.0% , Note: through terminal function: 44, implement PID given source switch	50.0%	○

PID control diagram as below:



Simple Illustration of the PID Control Operation and Adjustment

Proportional adjustment (Kp):

When there is a deviation between the feedback and reference, a proportional adjustment will be output. If the deviation is constant, the adjustment will be constant, too. Proportional adjustment can respond to the feedback change quickly, but it can not realize non-fault control. The proportional gain will increase with the adjustment speed, but too much gain may cause vibration. The adjustment method is: set a long integral time and derivative time to 0 first. Secondly make the system run by proportional adjustment and change the reference. And then watch the deviation of the feedback signal and the reference. If the static deviation is available (for example, increasing the feedback reference, the feedback will be less than the reference after a stable system), continue to increase the proportional gain, whereas decreased proportional gain. Repeat the action until the static deviation achieves a little. Value.

Integral time(Ti):

When there is a deviation between the feedback and reference, the output adjustment will accumulate. 0The adjustment will keep on increasing until the deviation disappears. The integral adjuster can cancel eliminate the static deviation effectively. Vibration may occur as a result of unstable system caused by repeated over-adjusted if the integral adjuster is too strong. The features of kind of vibration are: the fluctuating feedback signal (around the reference) and increasing swing range will cause vibration. Adjust the integral time parameter from a big value to a little one to change the integral time and monitor the result until a stable system speed is available.

Derivative time(Td):

When the deviation between the feedback and reference has changed, a proportional adjustment of output and deviation will be output. The adjustment only depends on the direction and value of the deviation change rather than the deviation itself. The derivation adjustment controls the change of eedback signals according to the changing trend when it fluctuates. Because of the derivative adjustment may enlarge the interference to the system, especially the frequent-changing interference, please use it carefully. When the frequency command selection (F00.06, F00. 07) is 8 or the voltage setting channel selection (F04.27) is 6, the running mode of the AC drive is process PID control.

General steps of PID parameters setting

a. Ensure the proportional gain P

When ensure the proportional gain P, firstly remove the PID integration and derivation (set Ti=0 and Td=0, see the PID parameter setting for detailed information) to make proportional adjustment is the only method to PID. Set the input as 60%~70% of the permitted maximum value and increase gain P from 0 until the system vibration occurs, vice versa, and record the PID value and set it to 60% to 70% of the current value. Then the proportional gain P commission is finished.

b. Ensure the integral time Ti

After ensure the gain P, set an original value of a bigger integral time and decrease it until the system vibration occurs, vice versa, until the system vibration disappear. Record the Ti and set the integral time to 150%~180% of the current value. Then integral time commission is finished.

c. Ensure the differential time Td

Generally, it is not necessary to set Td which is 0.If it needs to be set, set it to30% of the value without vibration via the same method with P and Ti.

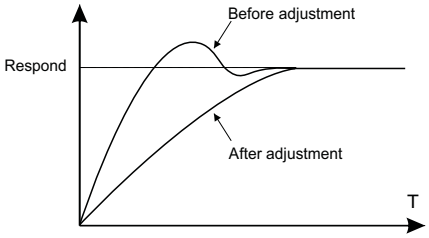
d. Ensure system no-load with load transfer, and then fine tuning the PID parameters until it is available.

PID Inching:

After setting the parameters of PID control, inching is possible by following means:

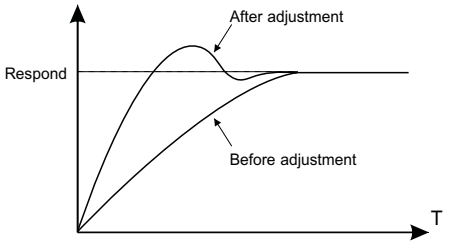
Control the overshoot :

shorten the derivative time(Td) and prolong the integral time(Ti) when appear overshoot.



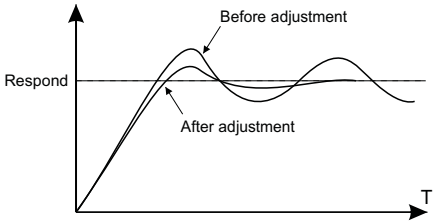
Reduce the stability of time:

Shorten the integral time (Ti) and prolong the derivation time(Td) even the overshoot occurs, but the control should be stable as soon as possible.



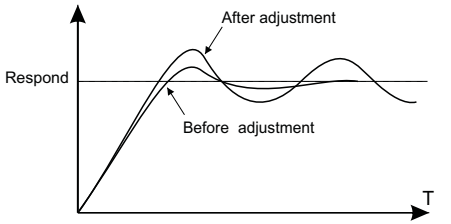
Control long vibration:

If the vibration period are longer than the set value of integral time(Ti), is is necessary to prolong the integral time(Ti) to control the vibration for the strong integration.



Control short vibration

Short vibration period and the same set value with the derivative time(Td) can control the vibration. When setting the derivative time as 0.00(no derivation control) is useless to control the vibration, decrease the gain.

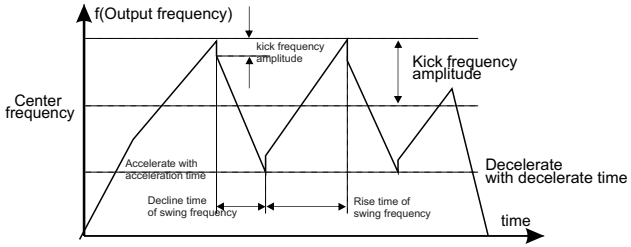


Group F0A Wobble, Length, Count and Timing Parameters Group

Function code	Name	Setup range	Default Value	Modification
F0A.00	Swing frequency amplitude	0.0~100.0%(Setting frequency)	0.0%	○
F0A.01	Kick frequency amplitude	0.0~100.0%(Swing frequency amplitude)	0.0%	○
F0A.02	Rise time of swing frequency	0.0~3600.0s	0.0s	○
F0A.03	Decline time of swing frequency	0.0~3600.0s	0.0s	○

Traverse is applied in some industries such as textile, chemical fiber and cases where traverse and convoltion is required.

Swing frequency function is the AC drive output frequency to set the frequency as the center of the upper and lower swing. The working flowchart is as below:



Swing amplitude is determined by F0A.00, when F0A.00, swing frequency is 0, means swing frequency is invalid.

Swing frequency amplitude: The frequency is restricted by the upper/down frequency.

Swing relative to the center frequency (set frequency): Swing frequency amplitude AW = center frequency F0A.00.

The kick frequency=Swing frequency amplitude AW×the kick frequency amplitude F0A.01, that is the swing frequency operation , the value of the frequency of sudden jump swing.

Rise time of swing frequency: Running from the lowest point to the highest point of the wobble amount of time.

Decline time of swing frequency:Running from the highest point to the lowest point of the wobble amount of time.

Function code	Name	Setup range	Default Value	Modification
F0A.04	Setup length	0~65536m	0m	○
F0A.05	Designed length	0~65536m	0m	●

Setting length, the actual length and the unit pulses number of the three functional ones are mainly used code length control.

HDI1 is calculated by the length of the pulse signal input terminal, it need to set HDI1 terminal to length count input.

Actual length = Length count input pulses/ones pulses.

When the actual length exceeds the length FA.05 F0A.04, multifunction digital out terminal "length reached" theoutput ON signal.

Function code	Name	Setup range	Default Value	Modification
F0A.06	The number of pulses of each rotate	1~10000	1	○
F0A.07	Circumference of the shaft	0.01~100.00cm	10.00cm	○
F0A.08	Length multiples	0.001~10.000	1.000	○
F0A.09	Length correction factor	0.001~1.000	1.000	○

6

F0A.06 number of Pulse per rotation refers to the outer rotating per revolution of shaft input the number of pulses.

F0A.07 Alxe perimeter refers to the outer perimeter of the circumference of the rotary shaft length. The unit is cm.

The AC drive calculate total length = (length calculated by Pulse) × F0A.08 × F0A.09.

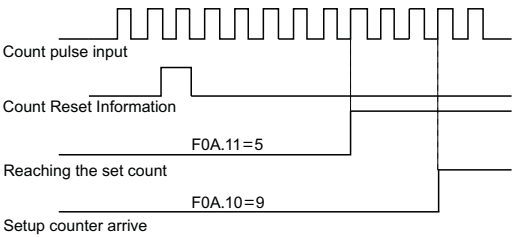
Function code	Name	Setup range	Default Value	Modification
F0A.10	Set count value	F0A.11~65535	0	○
F0A.11	Designated count value	0~F0A.10	0	○

HD500 series AC drive support fixed-length control function which can input length counting pulse through HDI1, and then count the actual length according to the internal counting formula.

If the actual length is longer than or equal to the set length, the digital output terminal can output the length arrival pulse signal of 200ms and the corresponding length will clear automatically.

F0A.11 designated counting value is not greater than the set count value F0A.10.

The function as shown:



Function code	Name	Setup range	Default Value	Modification
F0A.12	Running time setting	0~65535min	0	○

Pre-seting AC drive running time. When the accumulated running time reaches the setting running time, the multi-function digital output terminal "Running time arrival" signal.

Function code	Name	Setup range	Default Value	Modification
F0A.13	Exact stop mode	0~2	0	○

0 : Invalid

1 : Setting length arrive

2 : Setting count value arrive

3 : Setting running time arrive

Function code	Name	Setup range	Default Value	Modification
F0A.14	Reserved	0	0	●

This parameter is Reserved.

GroupF0B Simple PLC and Multi-speed Control Group

Function code	Name	Setup range	Default Value	Modification
F0B.00	Simple PLC running method	0~2	0	○

0 : Stopping after a running cycle. The AC drive automatically shut down after complete a single cycle, it need to give a run command again to start.

1 : Keeping final value operation after a running cycle. The AC drive automatically maintain the operating frequency and direction of the last paragraph after complete a single cycle.

2 : Cycle running. The AC drive automatically starts the next cycle until appear stop command and the system stop after complete a single cycle.

Function code	Name	Setup range	Default Value	Modification
F0B.01	Simple PLC memory selection when in power loss	0~1	0	○

0 : Power failure without memory

1 : Power failure with memory

Function code	Name	Setup range	Default Value	Modification
F0B.01	Simple PLC memory selection	0: Power loss without memory 1: Power loss memory	0	○
F0B.02	Multi-step speed 0	-100.0~100.0%	0.0%	○
F0B.03	The running time of step 0	0.0~6553.5s(min)	0.0s	○
F0B.04	Multi-step speed 1	-100.0~100.0%	0.0%	○
F0B.05	The running time of step 1	0.0~6553.5s(min)	0.0s	○
F0B.06	Multi-step speed 2	-100.0~100.0%	0.0%	○
F0B.07	The running time of step 2	0.0~6553.5s(min)	0.0s	○
F0B.08	Multi-step speed 3	-100.0~100.0%	0.0%	○
F0B.09	The running time of step 3	0.0~6553.5s(min)	0.0s	○
F0B.10	Multi-step speed 4	-100.0~100.0%	0.0%	○
F0B.11	The running time of step 4	0.0~6553.5s(min)	0.0s	○
F0B.12	Multi-step speed 5	-100.0~100.0%	0.0%	○
F0B.13	The running time of step 5	0.0~6553.5s(min)	0.0s	○
F0B.14	Multi-step speed 6	-100.0~100.0%	0.0%	○

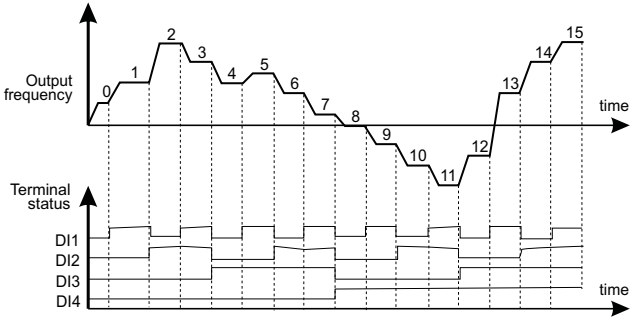
Function code	Name	Setup range	Default Value	Modification
F0B.15	The running time of step 6	0.0~6553.5s(min)	0.0s	○
F0B.16	Multi-step speed 7	-100.0~100.0%	0.0%	○
F0B.17	The running time of step 7	0.0~6553.5s(min)	0.0s	○
F0B.18	Multi-step speed 8	-100.0~100.0%	0.0%	○
F0B.19	The running time of step 8	0.0~6553.5s(min)	0.0s	○
F0B.20	Multi-step speed 9	-100.0~100.0%	0.0%	○
F0B.21	The running time of step 9	0.0~6553.5s(min)	0.0s	○
F0B.22	Multi-step speed 10	-100.0~100.0%	0.0%	○
F0B.23	The running time of step 10	0.0~6553.5s(min)	0.0s	○
F0B.24	Multi-step speed 11	-100.0~100.0%	0.0%	○
F0B.25	The running time of step 11	0.0~6553.5s(min)	0.0s	○
F0B.26	Multi-step speed 12	-100.0~100.0%	0.0%	○
F0B.27	The running time of step 12	0.0~6553.5s(min)	0.0s	○
F0B.28	Multi-step speed 13	-100.0~100.0%	0.0%	○
F0B.29	The running time of step 13	0.0~6553.5s(min)	0.0s	○
F0B.30	Multi-step speed 14	-100.0~100.0%	0.0%	○
F0B.31	The running time of step 14	0.0~6553.5s(min)	0.0s	○
F0B.32	Multi-step speed 15	-100.0~100.0%	0.0%	○
F0B.33	The running time of step 15	0.0~6553.5s(min)	0.0s	○

Frequency setting100% corresponds to the maximum output frequency F00.03.
When choosing simple PLC runtime, it need to set F0B.02 ~ F0B.33 to determine its opera-ting frequency and direction.

Note:
Multi-step speed sign determines the direction of simple PLC. The negative value indicates reverse direction.

Multi-step speed can continuous set within -f max. ~ f max. range.

HD500 AC drive can be set to 16-speed, which multi-step speed terminal by a combination of coding select 1 ~ 4, it corresponding multi-step speed 0 to 15.



When F00.06, F00.07 is not equal to 6 (PLC setting) and 7 (multi-step speed), and F00.06, F00.07 is not equal 8 (PID setting) or F09.00 (PID reference) is not equal to 5(multi-step speed), the multi-speed is preference to other setting, if DI1,DI2, DI3, DI4 all for OFF, the frequency input mode are selected by F00.06 and F00.07. If DI1, DI2, DI3, DI4 all not for OFF, then according to the multi-speed 0 ~ 15 period of speed.

When one of the F00.06, F00.07 is 6 or 7, the frequency input mode is selected by the F00.06 and the F00.07, the multi-speed can set 0~15 segment speed.

DI1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DI2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DI3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DI4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
段	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

6

F0B. 2n (1 <n <17) setting range: -100.0~100.0%

F0B. (2n+1 , 1<n<17)setting range : 0.0~6553.5s (s/min)

Function code	Name	Setup range	Default Value	Modification
F0B.34	Simple PLC 0-7 step ACC/DEC time	0x0000~0xFFFF	0x0000	○
F0B.35	Simple PLC 8-15 step ACC/DEC time	0x0000~0xFFFF	0x0000	○

The Detail Description Table

Function code	Bit		Segment	Acc and Dec time1	Acc and Dec time2	Acc and Dec time3	Acc and Dec time4
F0B.34	BIT1	BIT0	0	00	01	10	11
	BIT3	BIT2	1	00	01	10	11
	BIT5	BIT4	2	00	01	10	11
	BIT7	BIT6	3	00	01	10	11
	BIT9	BIT8	4	00	01	10	11
	BIT11	BIT10	5	00	01	10	11

Function code	Bit		Segment	Acc and Dec time1	Acc and Dec time2	Acc and Dec time3	Acc and Dec time4
F0B.34	BIT13	BIT12	6	00	01	10	11
	BIT15	BIT14	7	00	01	10	11
F0B.35	BIT1	BIT0	8	00	01	10	11
	BIT3	BIT2	9	00	01	10	11
	BIT5	BIT4	10	00	01	10	11
	BIT7	BIT6	11	00	01	10	11
	BIT9	BIT8	12	00	01	10	11
	BIT11	BIT10	13	00	01	10	11
	BIT13	BIT12	14	00	01	10	11
	BIT15	BIT14	15	00	01	10	11

Users choose the appropriate section of the acc/ dec time, the combination of the 16 binary number convert into sixteen decimal numbers, and setting the corresponding function code.

Function code	Name	Setup range	Default Value	Modification
F0B.36	PLC restart	0~2	0	◎

0 : Restart from the first stop. Running stop (caused by the stop command ,causes or power-fail), it restart from the first stage.

1 : Continue to run from the stage range frequency. Running stop(due to stop command or fault), the drive automatically records the current phase running time, re-start automatically enter the stage, which defined frequency to continue running the remaining time.

2 : Continue to run from the running frequency.The AC drive not only automatically records the running time of the current stage but also the running frequency of the shutdown time.After restarting, the running frequency is restored to frequency at the stop moment, and continue running follow with the the remaining time of the stage.

Function code	Name	Setup range	Default Value	Modification
F0B.37	Multi-step time unit	0~1	0	◎

0 : S: The various stages of running time by seconds.

1 : Min: The various stages of running time by minutes .

Group F0C Protection Parameter Group

Function code	Name	Setup range	Default Value	Modification
F0C.00	Phase loss protection	0x00~0x11	0x11	○

This parameter setting is used to select whether input phase and input phase loss protection.

F0C.00 Phase Protection Instruction

Phase Protection Instruction	
LED ones	0: Input phase loss protection disable 1: Input phase loss protection enable
LED tens	0: Input phase loss protection disable 1: Input phase loss protection enable

Function code	Name	Setup range	Default Value	Modification
F0C.01	Frequency decreasing at sudden power loss	0~1	0	○

0: frequency decreasing at sudden power loss enable.

1: frequency decreasing at sudden power loss disable

This parameter setting is used to select frequency decreasing at sudden power function valid or invalid.

6

Function code	Name	Setup range	Default Value	Modification
F0C.02	Frequency decreasing ratio at sudden power loss	0.00Hz~F00.03/s (max. frequency)	10.00 Hz/s	◎

Setting range: 0.00Hz/s~F00.03/s(Max. output frequency)

When F0C.01=1, frequency decreasing at sudden power loss function is valid. After the power grid shut down, the momentary power bus voltage drops down, AC drive start according to momentary power frequency decreasing rate (F0C.02) reduce the operating frequency, the motor in the power feedback status , so feed the energy to maintain the bus voltage at a certain voltage point(as show the table below), which can avoid the drive malfunction due to bus undervoltage and free parking, especially for high inertia loads, motor coasts to stop after a long time to stop down, affecting the normal run. When the power grid timely recovery, the output frequency continues to run until the command frequency return to the normal state.

Voltage level	220V	380V
frequency decreasing at sudden power loss point	260V	460V

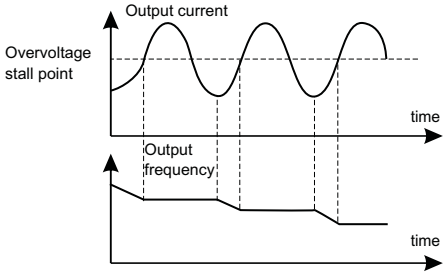
Note : Adjusting this parameter appropriately can avoid the grid switching, as a result of the AC drive to protect production downtime. It must be prohibit input phase protection in order to enable this function.

Function code	Name	Setup range	Default Value	Modification
F0C.03	Over-voltage stall protection	0~1	1	○

0 : Invalid

1 : Valid

Setting the valid of the overvoltage stall protection function.



Function code	Name	Setup range	Default Value	Modification
F0C.04	Voltage protection of over-voltage stall	120~150% (AC drive standard bus voltage)	120% (220V) 135% (380V)	○

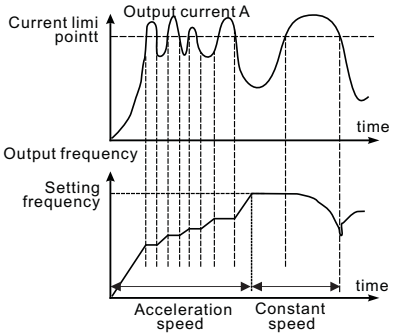
This parameter set over-voltage stall protection points. When the bus voltage exceeds the over-voltage protection point voltage, the AC drive adjust output frequency in order to avoid the increase of bus voltage in the power generation state. The frequency acceleration will be further increased if the AC drive is in the acceleration state. The AC drive frequency output will increase in a constant speed state. It will remain constant in a deceleration state.

Function code	Name	Setup range		Default Value	Modification
F0C.05	Current limit action selection	0: Disable 1: Enable		1	◎
F0C.06	Automatic current limit	50.0~200.0%	166%(G-type load) 120%(P-type load)		○

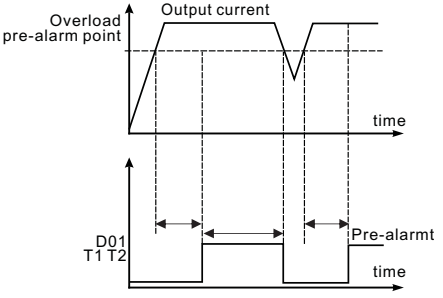
Function code	Name	Setup range	Default Value	Modification
F0C.07	Frequency decreasing ratio during current limit	0.00~50.00Hz/s	10.00 Hz/s	◎

During the AC drive in the accelerate operation, the load too large lead to international motor speed is lower than the increase rate of the output frequency. If without take measures, it will result in accelerated over-current fault and caused the drive trip.

Comparison the limit protection during the operation of the AC drive by detecting the output current and the current limit level F0C.06, when the level exceeds the limit as well as in the acceleration running, the AC drive running steadily. If it constant speed operation, the AC drive drop-run. If it sustained over current limit level, the output frequency will continue to fall until to the lower limit frequency. When detected again the output current is below the current limit level, the continue to accelerate running.



F0C.05~F0C.07 Group



F0C.08~F0C.10 Group

Function code	Name	Setup range	Default Value	Modification
F0C.08	Phase loss protection	LED hundreds: 0: Detection all the time 1: Detection in constant running	0x0000	○
F0C.09	Overload pre-alarm detection	F0C.12~200%	G type:150% P type: 120%	○
F0C.10	Overload pre-alarm detection time	0.1~60.0s	0.0s	○

The AC drive or motor output current greater than the overload pre-alarm detection level (F0C.09), and the duration exceeds the overload warning delay time (F0C.10), the output overload warning signal.

F0C.08 setting range: Enable and define the AC drive and motor overload alarm function.

Setting range : 0x000~0x131:

F0C.08 Parameter set Function Instruction

AC drive or Motor overload Pre-alarm	
LED ones	0: Overload pre-alarm of the motor, relative to the rated current of the motor. 1: Overload pre-alarm of the AC drive relative to the rated current of the AC drive.
LED tens	0: The AC drive continues to work after under load pre-alarm 1: The AC drive continues to work after underload pre-alarm and the AC drive stops to run after overload fault
LED hundreds	0: Detection all the time 1: Detection in constant running

Function code	Name	Setup range	Default Value	Modification
F0C.11	Underload pre-alarm of motor/AC drive	0x000~0x111	0x0000	○

During the AC drive in the accelerate operation, the load too large lead to international motor speed is lower than the increase rate of the output frequency. If without take measures, it will result in accelerated over-current fault and caused the drive trip.

Comparison the limit protection during the operation of the AC drive by detecting the output current and the current limit level F0C.06, when the level exceeds the limit as well as in the acceleration running, the AC drive running steadily. If it constant speed operation, the AC drive drop-run. If it sustained over current limit level, the output frequency will continue to fall until to the lower limit frequency. When detected again the output current is below the current limit level, the continue to accelerate running.

F0C.11 Parameter set Function Instruction

AC drive or Motor Underload Pre-warming Selection	
LED ones	0: Motor underload pre-alarm, relative to the motor rated current 1: Motor underload pre-alarm, relative to the AC drive rated current
LED tens	0: AC drive continue running after overload alarm 1: AC drive stops after underload fault
LED hundreds	0: Detection all the time 1: Detection in constant running

Function code	Name	Setup range	Default Value	Modification
F0C.12	Underload pre-alarm detection	0%~F0C.09	30%	○
F0C.13	Underload pre-alarm detection time	0.1~60.0s	1.0s	○

AC drive or motor output current is less than underload pre-alarm detection level (F0C.12), and the duration exceeds the overload warning delay time (F0C.13), output underload warning signal.

Function code	Name	Setup range	Default Value	Modification
F0C.14	Output terminal action during fault	0x00~0x11	0x0000	○

F0C.14 Parameter Set Function Instruction

Fault Output Terminal Action Selection	
LED ones	0: Underload under fault undervoltage 1: No action under fault undervoltage
LED tens	0: Action during automatic reset 1: No action during the automatic reset

Function code	Name	Setup range	Default Value	Modification
F0C.15	Carrier frequency adjustment selection	0x00~0x11	0x0000	○

F0C.15 Parameter Set Function Instruction

Carrier Frequency Adjustment Selection	
LED ones	0: Fixed carrier frequency 1: Carrier frequency automatically adjust as the temperature arises.
LED tens	0: Fixed carrier frequency 1: Carrier frequency automatically adjusted when it is overloaded.

Function code	Name	Setup range	Default Value	Modification
F0C.16	PWM mode	0~1	1	◎

0: Three-phase modulation

1: Three-phase with two-phase modulation switching

Function code	Name	Setup range	Default Value	Modification
F0C.17	Low frequency filter selection	0~1	1	◎

0: Low-frequency carrier invalid

1: Low-frequency carrier valid

When the AC drive in low-frequency running, it can carry out limit or force to reduce carrier for the low-frequency running carrier , and in order to reduce the effect of PWM wait time on the output voltage. By setting the parameter F0C.17 enable or prohibit the low-frequency carrier function.

Function code	Name	Setup range	Default Value	Modification
F0C.18	Reserved	0	0	●

This parameter is Reserved.

GroupF0D Motor 2 Parameter Group

Function code	Name	Setup range	Default Value	Modification
F0D.00	Motor type 2 control mode	0~1	0	◎

0 : V/F control

1 : Vector control 0 mode

Please refer to the relevant solutions of F00.00 parameters.

Function code	Name	Setup range	Default Value	Modification
F0D.01	Load type	0~1	0	◎

0 : G type (Constant torque load)

1 : P type (Variable torque / lightload type)

Function code	Name	Setup range	Default Value	Modification
F0D.02	Motor type2	0~1	0	◎

0 : General asynchronous motor , without independent fan in the long run low frequency heat dissipation effect, the AC drive heat protection will corresponding compensation.

1 : Variable frequency asynchronous motor, with independent fan without low frequency compensation.

Function code	Name	Setup range	Default Value	Modification
F0D.03	Rated power of motor 2	0.1~3000.0kW	Depend on model	◎
F0D.04	Rated voltage of motor 2	0~1200V	Depend on model	◎

Function code	Name	Setup range	Default Value	Modification
F0D.05	Rated current of motor 2	0.8~6000.0A	Depend on model	◎
F0D.06	Rated frequency of motor 2	0.01Hz~F00.03 (max. frequency)	Depend on model	◎
F0D.07	Rated speed of motor 2	1~36000rpm	Depend on model	◎

The above parameters are used to set the asynchronous motor 2 nameplate. Regardless of VF control or vector control, in order to ensure the control performance must be ensure to follow the induction motor nameplate parameters set correctly F0D.03 ~ F0D.07 value. Also note that if the motor power and standard motor gap is too large(over two power file), the control performance of the AC drive will be significantly reduced. HD500 AC drive provides parameter auto-tuning function. The exact parameters by learning from the motor nameplate parameters set correctly.

Note: Reseting the motor rated power (F0D.03), it can initialize F0D.05 ~ F0D.07 motor.

Function code	Name	Setup range	Default Value	Modification
F0D.08	Stator resistor of motor2	0.001~65.535Ω	Depend on model	◎
F0D.09	Rotor resistor of motor 2	0.001~65.535Ω	Depend on model	◎
F0D.10	Leakage inductance of motor 2	0.1~6553.5mH	Depend on model	◎
F0D.11	Mutual inductance of motor 2	0.1~6553.5mH	Depend on model	◎
F0D.12	Non-load current of motor 2	0.1~6553.5A	Depend on model	◎

F0D.08 ~ F0D.12 is asynchronous motor 2 identification parameters, these parameters are not appear in general motor nameplate, it need to auto-tuning motor parameters obtained by the AC drive. Dynamic auto-tuning can get F0D.08 ~ F0D.12 parameters, static auto-tuning F0D.08 ~ F0D.10 only can get three parameters, the other parameters remain the factory default value.

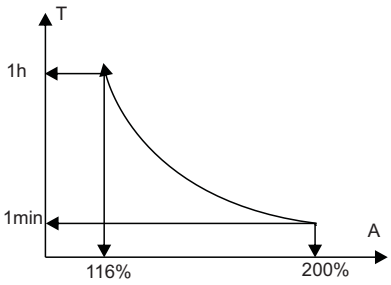
Function code	Name	Setup range	Default Value	Modification
F0D.13 ~25	Reserved	0	0	●

F0D.13-25 parameters are reserved.

Function code	Name	Setup range	Default Value	Modification
F0D.26	Motor 2 overload protection selection	0 : Invalid 1 : Valid	1	◎
F0D.27	Motor 2 overload protection factor	50.0%~120.0%	100.0%	◎

The overload protection effective of the F0D.26 set motor 2.

The overload protection curve of the motor 2 is the inverse time limit curve. Motor 2 overload protection current = F0D.27xMotor 2 rated current when the overload current <110%xMotor 2 overload, the protection current invalid.overload protection is invalid.when the actual load current =116%x Motor 2 overload protection current, lasting 1 hour then report overload fault .when the actual load current =200%xMotor 2 overload protection current, lasting 1 min report overload fault , thegreater overload coefficient, the shorter of the fault time. Such as follows:



Group F0E Serial Communication Function Group

Function code	Name	Setup range	Default Value	Modification
F0E.00	Local communication address	0~247 (0 is communication address)	1	○

When the address of the machine is 0, the machine will be set up for the host, and send the Run frequency and start-stop command and start-stop command of the broadcast machine transmission on the bus. When the host sends a frame address set to 0, that is broadcast frame. At time all from the machine will accept the frame, buit the engine wthout response. Communication address of the machine in the network communication has uniqueness. This is the realization of the host computer and AC drive point to point communication.

Note: The slave address can not set to 0.

Function code	Name	Setup range	Default Value	Modification
F0E.01	Communication baud ratio	0~5	4	○

0: 1200BPS
1: 2400BPS
2: 4800BPS
3: 9600BPS
4: 19200BPS
5: 38400BPS

Note: PC with AC drive baud rate must be consistent, otherwise, it can not be hearing. The baud is bigger, the communication is faster .

Function code	Name	Setup range	Default Value	Modification
F0E.02	Digital bit checkout	0~5	1	○

0: No check(N , 8 , 1) for RTU
1: Even check(E , 8 , 1) for RTU
2: Odd check(O , 8 , 1) for RTU
3: No check(N, 8, 1) for RTU
4: Even check (E, 8, 2) for RTU
5: Odd check(O, 8, 1) for RTU

Note:PC with the data format converter setting must be consistent, otherwise, communication is impossible.

Function code	Name	Setup range	Default Value	Modification
F0E.03	Answer delay	0~200ms	5	○

AC drive data refers to the middle to upper receiving end sends response data interval. If the response delay less than the system processing time, the response delay time subject to the system processing. If response delay longer than the system processing time, the system due to the process data to delayed wait until the response delay time, then send data for the machine.

Function code	Name	Setup range	Default Value	Modification
F0E.04	Fault time of communication overtime	0.0 (Invalid) 0.1~60.0s	0.0s	○

When the function code is set to 0.0, the communication timeout parameter is invalid.

When the function code is set to a non-zero value, if a communication with the next communication interval exceeds communication overtime time, the system will report "485 Communcation Fault" (CE).

Typically, it will be set to inactive. If continuous communication system, setting this parameter can monitor the communication status.

Function code	Name	Setup range	Default Value	Modification
F0E.05	Transmission fault proccessing	0~3	0	○

0 : Alarm and stop freely

1 : No alarm and continue to run

2 : No alarm and stop according to the stop mode(Only under the communication control)

3 : No alarm and stop according to the stop mode(Under all control modes)

Function code	Name	Setup range	Default Value	Modification
F0E.06	Communication processing action selection	0~1	0	○

0: Write with response. The AC drive have response to the read and write command of the host mechine.

1 : Write without response. The AC drive only responds to the read and write command of the host mechine, and has no response to the write command. The communication efficiency can be improved by this method.

Function code	Name	Setup range	Default Value	Modification
F0E.07	Interval time send by Master	10ms-5000ms	200ms	○
F0E.08	MODBUS Communication mode selection	0~1	0	○

When was set in master mode, F0E.07 set the interval time of running frequency and start/stop command when master send broadcasts to slaves.

0: Standard RTU mode: when it is slave mode(addres is not 0), AC drive will receive and answer the reading/writing command send by master according to standard MODBUS RTU.

1: Mode 1: when it is slave mode, (address is not 0), AC drive not only receive and answer the reading/writing command send by master according to standard MODBUS RTU but also receive frequency and setting value from the broadcast command 0X20(0X20 command illustrations please refer to Chapters 9) from master.

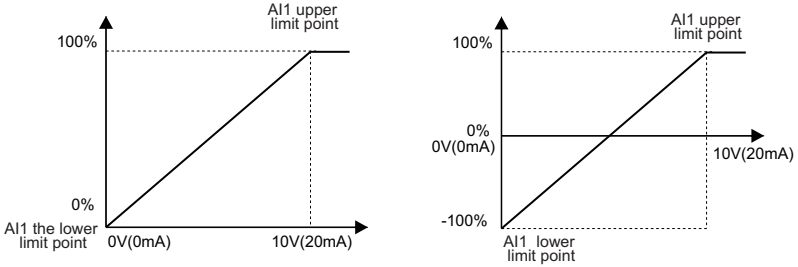
2: Mode 2: when it is slave mode(address is not 0), AC drive not only receive and anwer the reading/writing command command send by master according to standard MODBUS RTU but also receive frequency setting value and start/stop command from the broadcast command 0X20.

Note:This function is only valid when the address is not 0.When AC drive address is 0, AC drive is in master mode, and will send frequency and start/stop command to the slave by passing 0X20 command after the interval F0E.07.

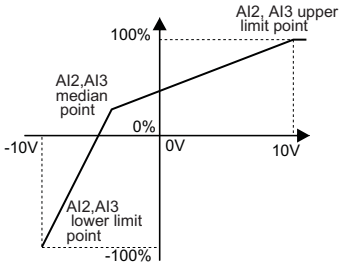
Group A01 AI Curve Setting Function Group

Function code	Name	Setup range	Default Value	Modification
A01.00	Lower limit of AI 1	0.00V~ A01.02	0.00V	○
A01.01	Corresponding setting of the lower limit of AI 1	-100.0%~100.0%	0.0%	○
A01.02	Upper limit of AI 1	A01.00~10.00VA01.02	10.00V	○
A01.03	Corresponding setting of the upper limit of AI 1	-100.0%~100.0%	100.0%	○
A01.04	Ai1 input filter time	0.000s~10.000s	0.100s	○
A01.05	Lower limit of AI2	-10.00V~ A01.09	-10.00V	○
A01.06	Corresponding setting of the lower limit of AI2	-100.0%~100.0%	0.0%	○
A01.07	Upper limit of AI2	A01.09~10.00V	10.00V	○
A01.08	Corresponding setting of the upper limit of AI2	-100.0%~100.0%	100.0%	○
A01.09	Middle value of AI2	A01.05~A01.07	0.00V	○
A01.10	Corresponding middle setting ofAI2	-100.0%~100.0%	0.0%	○
A01.11	AI2 input filter time	0.000s~10.000s	0.100s	○
A01.12	Lower limit of AI3	-10.00V~A01.14	0.00V	○
A01.13	Corresponding setting of the lower limit of AI3	-100.0%~100.0%	0.0%	○
A01.14	Upper limit of AI3	A01.12~10.00V	10.00V	○

Function code	Name	Setup range	Default Value	Modification
A01.15	Corresponding setting of the upper limit of AI3	-100.0%~100.0%	100.0%	○
A01.16	Middle value of AI3	A01.12~A01.14	0.00V	○
A01.17	Corresponding middle setting ofAI3	-100.0%~100.0%	0.0%	○
A01.18	AI3 input filter time	0.000s~10.000s	0.100s	○



AI1 input analog correspond curve



AI2,AI3 input analog correspond curve

Input filter time: Adjusting the sensitivity of the analog input . Appropriate to increase the amount of simulation can enhance immunity, but will weaken the analog input sensitivity.

Note: Analog AI 1 supply input 0~10V/0~20 mA . When AI 1 select input 0~20mA, 20mA corresponding to the voltage is 10V. AI 2, AI 3 supply input -10~+10V.

Function code	Name	Setup range	Default Value	Modification
A01.19	Keypad analog filter time	0.000~10.000s	0.050s	○

A01.19 setting Keypad analog input filter size may have a larger frequency fluctuation that via Keypad analog reference frequency in some interference occasion. A01.09 appropriate increase A01.19 can reduce the frequency fluctuation.

Group A02 Status Check Function Group

Function code	Name	Setup range	Default Value	Modification
A02.00	Setting frequency	0.00Hz~F00.03	0.00Hz	●
A02.01	Output frequency	0.00Hz~F00.03	0.00Hz	●
A02.02	Ramp reference frequency	0.00Hz~F00.03	0.00Hz	●
A02.03	Output voltage	0~1200V	0V	●
A02.04	Output current	0.0~5000.0A	0.0A	●
A02.05	Motor speed	0~65535rpm	0rpm	●
A02.06	Reserved	0	0	●
A02.07	Reserved	0	0	●
A02.08	Output Power	-300.0~300.0%(the rated current of the motor)	0.0%	●
A02.09	Output torque	-250.0~250.0%(the rated current of the motor)	0.0%	●
A02.10	Evaluated motor frequency	0.00~F00.03	0.00Hz	●
A02.11	DC bus voltage	0.0~2000.0V	0V	●
A02.12	Digital input terminals state	0x00~0xFF	0x00	●
A02.13	Digital output terminals state	0x0~0xF	0x00	●
A02.14	Digital adjustment	0.00Hz~F00.03	0.00Hz	●
A02.15	Reserved	0	0	●
A02.16	Linear speed	0~65535	0	●
A02.17	Length value	0~65535	0	●
A02.18	Counting value	0~65535	0	●
A02.19	AI1 input voltage	0.00~10.00V	0.00V	●
A02.20	AI2 input voltage	10.00~10.00V	0.00V	●
A02.21	AI3 input voltage	-10.00~10.00V	0.00V	●
A02.22	HDI1input frequency	0.00~50.00kHz	0.00kHz	●
A02.23	PID reference	-100.0~100.0%	0.0%	●
A02.24	PID feedback	-100.0~100.0%	0.0%	●
A02.25	PID output	-100.0~100.00%	0.00%	●

Function code	Name	Setup range	Default Value	Modification
A02.26	Power factor of the motor	-1.00~1.00	0.0	●
A02.27	Current running time	0~65535min	0m	●
A02.28	Simple PLC and the current step of the multi-step speed	0~15	0	○
A02.29	ASR controller output	-300.0%~300.0%(the rated current of the motor)	0.0%	●
A02.30	AO1 output	0-10.00V Note: 1V equals 2 mA when output current	0	○
A02.31	AO2 output	0-10.00V Note: 1V equals 2 mA when output current	0	○
A02.32	AC current	0.0~5000.0A	0.0A	●
A02.33	Output torque	-3000.0Nm~3000.0Nm	0.0Nm	●
A02.34	Count value of motor overload	0~100 (100 report E.OPL1 fault)	0	●
A02.35	Copy keypad EEPROM software version	0	0	●
A02.36	The current motor selection	1: Current motor 1 2: Current motor 2	1	●

A02 group parameters are display quantity, it only supply to the user view and can not be modified.

Group A03 DP Parameter Group

Appendix: SDDP01Using Programming

1.System Configuration

After correct install the SDDP01A communication card, it is necessary to configure the host station and ac drive to establish communication between the host station and the SDDP01A communication card.

Each PROFIBUS slave on the PROFIBUS bus has a "device description file" called GSD file that describe the characteristics of the PROFIBUS-DP device. GSD file contain all device define parameters. That including baud rate support, information length support, input / output data number and diagnostic data implications.

SDDP01A communication card GSD file (Extension: gsd) , GSD file of the communication card can be downloaded from our website or contact our sales staff. User can copy the GSD file to the configuration software tools in the relevant subdirectory, the specific operation and PROFIBUS system configuration method can be found in the related system configuration software, such as Siemens SIMATIC Manager programming software.

Function code	Name	Setting Range	Description	Default Value	Modification
A03.00	PPO type	0~4	Setting the communication type of host and slave, corresponding to PPO1 ~ PPO5 message type, the default is PPO3	2	◎
A03.01	DP Slave address	1~127	Setting the address of the DP slave station in system configuration	1	◎
A03.02	PZD3 Write	0~21	Receiving from the host to the inverter require data	0	○
A03.03	PZD4 Write	0~21		0	○
A03.04	PZD5 Write	0~21		0	○
A03.05	PZD6 Write	0~21		0	○
A03.06	PZD7 Write	0~21		0	○
A03.07	PZD8 Write	0~21		0	○
A03.08	PZD9 Write	0~21		0	○
A03.09	PZD10 Write	0~21		0	○
A03.10	PZD11 Write	0~21		0	○
A03.11	PZD12 Write	0~21		0	○
A03.14	PZD3 Read	0~54	The inverter send the current state to the host	0	○
A03.15	PZD4 Read	0~54		0	○
A03.16	PZD5 Read	0~54		0	○
A03.17	PZD6 Read	0~54		0	○
A03.18	PZD7 Read	0~54		0	○
A03.19	PZD8 Read	0~54		0	○
A03.20	PZD9Read	0~54		0	○
A03.21	PZD10 Read	0~54		0	○
A03.22	PZD11 Read	0~54		0	○
A03.23	PZD12 Read	0~54		0	○

Note：The function code A03.00 ~ A03.01 setup must be set consistent with the host, otherwise will affect the success of the system configuration. It is also required that the two parameters need to be changed again to make the inverter power on; the communication rate is determined by the system configuration.

2.Transmission Rate and Maximum Transmission Distance

The maximum length of the cable depends on the transmission rate, below table shows the relationship between the transmission rate and the transmission distance.

Transmission Rate (Kbps)	A Type Wire (m)	B Type Wire (m)
9.6	1200	1200
19.2	1200	1200
93.75	1200	1200
187.5	1000	600
500	400	200
1500	200	.....
12000	100	.....

Transmission line parameters

Transmission Rate (Kbps)	A Type Wire (m)	B Type Wire (m)
Impedance (Ω)	135~165	100~130
Capacitance per unit length (pF/m)	< 30	< 60
Loop resistance (Ω/km)	110	.....
Core diameter (mm)	0.64	> 0.53
Core diameter (mm)	> 0.34	> 0.22

3.Profibus-DP Communication Protocol;

6

Profubus-DP bus allows fast data exchange between host station and inverter. Access to the inverter device is always accordance with the host-slave mode. AC drive as slave station, PLC as host station, host and slave periodic data transmission, the data support PPO1, PPO2, PPO3, PPO4, PPO5 data form. The data block of the PP0 type data format is divided into two regions, namelyProfubus-DP bus allows fast data exchange between host station and inverter. Access to the inverter device is always accordance with the host-slave mode. AC drive as slave station, PLC as host station, host and slave periodic data transmission, the data support PPO1, PPO2, PPO3, PPO4, PPO5 data form. The data block of the PP0 type data format is divided into two regions, namely PKW area (the parameter identification area takes up 8 bytes) and PZD area (the process data area takes up to a maximum of 24 bytes), where PPO3, PPO4 contains only PZD data.

Each data format support the following functions:

Data Type	Support Function	PKW/PZD
PPO1	1. Single function code parameter read and write operation 2. Ac drive command and frequency setting 3. Ac drive status and running frequency read	Including PKW area PZD1, PZD2 data

Data Type	Support Function	PKW/PZD
PPO2	1. Single function code parameter read and write operation 2. AC drive command and frequency setting 3. AC drive status and running frequency read 4. Four communication parameters period write 5. Four communication parameters period read	Including PKW area PZD1~PZD6 data
PPO3	1.AC drive command and frequency setting 2.AC drive status and running frequency read	Only support PZD1,PZD2data
PPO4	1.AC drive command and frequency setting 2.AC drive status and running frequency read 3. Four communication parameters period write 4. Four communication parameters period read	Only support PZD1~PZD6 data
PPO5	1. Single function code parameter read and write operation 2. AC drive command and frequency setting 3. AC drive status and running frequency read 4. Ten communication parameters period write 5. Ten communication parameters period read	Including PKW area PZD1~PZD12 data

Parameter Identification Area (PWK) Description：

PKW data contain three sets of array area, respectively the CMD accounted for 2 bytes, IND accounted for 2 bytes and VAL accounted for 4 bytes, which can achieve the function code parameter read and write operation.

Parameter Identification Area(PWK)							
Command Code	Function Code		Reserve			Parameter Value	
CMD	CMD	IND	IND	CMD	VAL	VAL	VAL

Data form such as following:

Host Station Send Data PKW Description			AC Drive Response Data Description		
CMD	Bit 15:12	Operation command code 0：No operation 1：Function code parameter read 2：Function code parameter write to RAM 4：Function code parameter write to EEPROM	CMD	Bit 15：12	Response code 0：No operation 1：Function code parameter read-write correctly 7：Cannot executed correctly
	Bit 11：8	Reserve		Bit 11：8	Reserve
	Bit 7：0	Function code address high 8 bit		Bit 7：0	Function code address high 8 bit
IND	Bit 15：8	Function code address low 8 bit	IND	Bit 15：8	Function code address low 8 bit
	Bit 7：0	Reserve		Bit 7：0	Reserve
VAL	Bit31：16	Reserve	VAL	Bit31：16	Reserve
	Bit15：0	Reading out of use and writing indicate function code parameter value		Bit15：0	Operation success：Return parameter value Operation failed：Return error code

Error code summary：

Error Code	Name
1	Illegal CMD
2	Illegal Data Add
3	Illegal data value
4	Operation failed
5	Password error
6	Data frame error
7	Parameters only for read
8	Parameters can not be changed during running
9	Password protection

Process Data Area (PZD)：

PZD area data realizes the data change, the reading and periodical data interaction of the host station in real-time. The communication address of the data is set by A03 parameter group, which can realize the control command, and the target frequency real-time reference in the current status of the inverter, read running frequency and modify parameter and monitoring parameters in real-time.

Process Data Area (PZD)											
PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10	PZD11	PZD12

Each PZD data consists of two bytes.

Host station send data PZD		
Run command of ac drive	Target frequency of ac drive	Real-time modification of function parameters of ac drive
PZD1	PZD2	PZD3
AC drive responds host station data PZD		
Running state of ac drive	Running frequency of ac drive	Real-time read of function parameters of ac drive
PZD1	PZD2	PZD3~PZD12

Description of host station send data PZD	
PZD1	AC drive run command （Run command sets as communication and given by DP） 0：No-operation 1：Forward running 2：Reverse Running 3：Forward Jogging 4：Reverse Jogging 5：Stop 6：Coast to stop（Emergency shutdown） 7：Fault reset 8：Jogging stop
PZD2	AC drive target frequency (frequency source must be set by DP communication reference) Given range：Depending on the maximum output frequency F00.03, when the setup value is greater than the F00.03, the frequency reference is not response.
PZD3~PZD12	Modify the parameter values in real time，set the parameters through A03.02～A03.11 as shown in the following table

PZD3～PZD12 Parameter value modify selection setting

Name	Value	Description
PZD3 PZD4 PZD5 PZD6 PZD7 PZD8 PZD9	0：No-operation 1：Reserve 2：PID setting（0~1000，1000 corresponding 100.0%） 3：PID feedback（0~1000，1000 corresponding 100.0%） 4：Torque setting value（-3000~3000，1000 corresponding 100.0% Rated current of motor） 5：Forward upper limit frequency setting value（0~Fmax（Unit：0.01Hz）） 6：Reverse upper limit frequency setting value（0~Fmax（Unit：0.01Hz）） 7：Upper limit torque of electric torque（0~3000，1000 corresponding 100.0% motor current） 8：Upper limit torque of braking torque（0~3000，1000 corresponding 100.0% Rated current of motor）	

Name	Value	Description
PZD10 PZD11 PZD12	9：Special control command： Bit0~1：=00：motor 1 =01：motor 2 =10：motor 3 =11：motor 4 Bit2：=1 torque control =0：speed control 10：Virtual input terminal command，range：0x000~0x1FF 11：Virtual output terminal command，range：0x00~0x0F 12：Voltage setting value（V/F separation） （0~1000，1000 corresponding 100.0% Rated voltage of motor） 13：AO or HDO output setting value 1（-1000~1000，1000 corresponding 100.0%） 14：AO or HDO output setting value 2（-1000~1000，1000 corresponding 100.0%） 15：Reserve 16：Manufacturer Barcode 1 17：Manufacturer Barcode 2 18：Manufacturer Barcode 3 19：Manufacturer Barcode 4 20：Manufacturer Barcode 5 21：Manufacturer Barcode 6	

AC drive responds host station data PZD		
PZD1	Bit 15:8	Indicate the PZD data setting state 0：The modification of run command frequency reference or parameter is correct 1：Run command or frequency reference is incorrect. 2：The modification of parameter is incorrect 3：The modifications of run command or frequency reference and parameter are incorrect.
	Bit 7:0	Indicate the current running state of ac drive 1：Forward running 2：Reverse running 3：At stopping 4：AC drive failure 5：In POFF state
PZD2	Current running frequency of ac drive	
PZD3~ PZD12	Read the parameter values in real time，set the parameters through A03.14 ~ A03.23 as shown in the following table	

PZD3 ~ PZD12 Parameter value read selection setting：

Name	Value	Description
PZD3 PZD4 PZD5 PZD6 PZD7 PZD8 PZD9 PZD10 PZD11 PZD12	0: No-operation 1: Setting frequency(Hz flash) 2: Bus voltage(V ON) 3: Output voltage (V ON) 4: Output current (A ON) 5: Running rotation speed (rpm ON) 6: Output power (% ON) 7: Output torque (% ON) 8: PID reference(% Flash) 9: PID feedback(% ON) 10: Input terminal state 11: Output terminal state 12: Torque setting value(% ON) 13: Pulse count value 14: Length value 15: PLC current segment number 16: Current segment number of multiple speed 17: AI1 value (V ON) 18: AI2 value (V ON) 19: AI3 value (V ON) 20: HDI frequency 21: Motor overload percentage(% ON) 22: Inverter overload percentage(% ON) 23: Ramp frequency given value (Hz ON) 24: Linear speed 25： AC input current 26: Setting rotation speed 27: Setting linear speed 28: Converter module temperature 29: Reserve 30: Running frequency at current fault 31: Ramp reference frequency at current fault 32: Output voltage at current fault 33: Output current at current fault 34: Bus voltage at current fault 35: The max. temperature at current fault 36: Input terminal state at current fault 37: Output terminal state at current fault 38: Reserve 39: Reserve 40: Manufacturer Barcode 1 41: Manufacturer Barcode 2 42: Manufacturer Barcode 3 43: Manufacturer Barcode 4 44: Manufacturer Barcode 5 45: Manufacturer Barcode 6	

4. Application Examples

a. Set the function code F0.06 = 11 A channel frequency command is given by DP communication to 25.00Hz.（PPO1 format）

Host station send data

CMD	IND	VAL	VAL	PZD1	PZD2
0x2000	0x06xx	xxxx	0x000B	0x0000	0x09C4

xx-Data does not need to be setting

Here CMD high byte is 0x10 so write to RAM only, the data will not be saved to the EEPROM. Program execution is written periodically. Be careful when writing data to the EEPROM in order not to affect its service life.

Note: Some function codes can only be written in standby, write in the operation will return to the error communication state.

AC drive response data

CMD	IND	VAL	VAL	PZD1	PZD2
0x1000	0x0600	0x000	0x000B	0x0003	0x0000

CMD： 0x1000 Data is written successfully

PZD1：0x0003 The AC drive is in a shutdown state at present

PZD2：0x0000 The current output frequency of the ac drive is 0Hz

b、AC drive reverse start running and it's frequency is given to 40.00Hz（PPO3 format）

Host station send data

PZD1	PZD2
0x0002	0x0FA0

AC drive response data

PZD1	PZD2
0x0002	0x0FA0

The ac drive correctly responds to the data request of the host station and the current running frequency reaches 40Hz.
In order to respond to the host's run command, the frequency inverter must be set F00.01 = 3 or 4，F00.02 = 2.

c、 Communication setting PID reference 90.0%, PID feedback 85.0%, AO1 output setting 100.0%, AO2 output setting 50.0%; At the same time read setting frequency, bus voltage, output current and output power（PPO5 format）

To implement this data interaction, you must set the following function code:

A03.02 = 2 PZD3 receive data as PID reference
A03.03 = 3 PZD4 receive data as PID feedback
A03.04 = 13 PZD5 receive data as AO1 output setting
A03.05 = 14 PZD6 receive data as AO2 output setting
A03.14 = 1 PZD3 read setting frequency
A03.15 = 2 PZD3 read bus voltage

A03.16 = 4 PZD3 read output current
A03.17 = 6 PZD3 read output power
F09.00 = 8 PID reference source is set by DP communication
F09.02 = 6 PID feedback source is set by DP communication
F06.14 = 19 AO1 is set by DP communication reference 1
F06.15 = 20 AO2 is set by DP communication reference 2

Host station send data

CMD	IND	VAL	VAL	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
0x0000	XXXX	XXXX	XXXX	XXXX	XXXX	0x384	0x352	0x3E8	0x1F4

CMD ：Do not operate the functional parameters, IND and VAL no need setting.

Note: The PPO5 data format is used to set the running command and target frequency. For example, pay attention to PZD1 and PZD2 data setting when running command or target frequency selection is given by DP Communication ; No need to set PZD1 and PZD2 data when running command or target frequency selection is not given by DP Communication .

xx-Data no need to setting, please note the settings of PZD1 and PZD2.

AC drive response data

CMD	IND	VAL	VAL	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
0x0000	XXXX	XXXX	XXXX	0x0001	0x1388	0x1388	0x1518	0x33	0x384

PZD1：0x0001 AC drive is in forward running state

PZD2：0x1388 AC drive is running at 50Hz

PZD3：0x1388 The setting frequency of ac drive is 50Hz

PZD4：0x1518 The bus voltage of ac drive is 540.0V

PZD5：0x33 The output current of ac drive is 5.1A

PZD6：0x384 The output power of ac drive is 90.0%

Tips：Due to adopt PPO5 data format support PZD1 ~ PZD12, and without use the PZD7 ~ PZD12 can do not setting. Keep A03.06~A03.11 = 0, A03.18~A03.23 = 0.

5.Definition of Function Code in Communication

Function Code Group	Address	Function Code Group	Address
F00 Group	0x00	F01 Group	0x01
F02 Group	0x02	F03 Group	0x03
F04 Group	0x04	F05 Group	0x05
F06 Group	0x06	F07 Group	0x07
F08 Group	0x08	F09 Group	0x09
F0A Group	0x0A	F0B Group	0x0B

Function Code Group	Address	Function Code Group	Address
F0C Group	0x0C	F0D Group	0x0D
F0E Group	0x0E	A00 Group	0x0F
A01 Group	0x10	A02 Group	0x0F
A03 Group	0x12		

6. SDDP01A Communication Card LED Work Status Indicator

There are two indicators (D2 and D3) on the SDDP01A communication card. The two indicators are used to let the user know the current state of the SDDP01A communication card in the system. The SDDP01A communication card serves as an intermediate link in the system to receive the request data sent by the host station and transmit it to the inverter. After receiving the request, the inverter responds and returns the data to the SDDP01A communication card, and then returns it to the host station. The SDDP01A communication card and inverter constitute slave stations of the whole system.

Indicator Status

Name	Definition	Status	Description
D2	Whether the data communication of host station and SDDP01A communication card is normal	Flash	Flashing at once per second, indicating that the current host station communicates with the SDDP01A card error, the site may have interference, or the slave station Multi baud rate is too low.
		OFF	Indicates that the current host station is not set up communication with the SDDP01A card (check cable connection, configuration address and PPO data type)
		Always ON	Communication between host station and SDDP01A card is normal.
D3	Whether the communication of SDDP01A and ac drive is normal	Flash	Flashing at once per second, indicating that the current host station communicates with the SDDP01A card error, the site may have interference
		OFF	Indicates that the current host station is not set up communication with the SDDP01A card (check hardware connection or whether the inverter supports DP expansion)
		Always ON	Communication between host station and SDDP01A card is normal.

Name	Definition	Status	Description
D2、D3	Hardware self-detection and initialization wait	Both flash quickly	Flashing four times per second, indicating that the SDDP01A card hardware fault.
		Both OFF	Just 7s to 10s on the power of the time as the initialization wait for the two LEDs in the OFF state, such as beyond this time is too long to lit LEDs, it is considered that there is a abnormal card need to be replaced.

Chapter 7

EMC

7.1 Definition of Related Terms

1. EMC

Electromagnetic compatibility (EMC) describes the ability of electronic and electrical devices or systems to work properly in the electromagnetic environment and not to generate electromagnetic interference that influences other local devices or systems.In other words, EMC includes two aspects: The electromagnetic interference generated by a device or system must be restricted within a certain limit; the device or system must have sufficient immunity to the electromagnetic interference in the environment.

2. First environment:

Environment that includes domestic premises, it also includes establishments directly connected without intermediate transformers to a low-voltage power supply network which supplies buildings used for domestic purposes.

3. Second environment:

Environment that includes all establishments other than those directly connected to a low-voltage power supply network which supplies buildings used for domestic purposes.

4. Category C1 AC drive

Power Drive System (PDS) of rated voltage less than 1 000 V, intended for use in the first environment.

5. Category C2 AC drive:

PDS of rated voltage less than 1 000 V, which is neither a plug in device nor a movable device and, when used in the first environment, is intended to be installed and commissioned only by a professional.

6. Category C3 AC drive:

PDS of rated voltage less than 1000V, intended for use in the second environment and not intended for use in the first environment.

7

7. Category C4 AC drive:

PDS of rated voltage equal to or above 1000V, or rated current equal to or above 400A, or intended for use in complex systems in the second environment.

7.2 EMC Standard Introduction

7.2.1 EMC Standard

HD500 series AC drive to satisfies the requirements of standard EN61800-32: 004 Category C2. The AC drive areapplied to both the first environment and the second environment.

7.2.2 EMC Installation Environment

The system manufacturer using the AC drive is responsible for compliance of the system with the European EMC directive. Based on the application of the system, the integrator must ensure that the system complies with standard EN 61800-3: 2004 Category C2, C3 or C4.

The system (machinery or appliance) installed with the AC drive must also have the CE mark. The system integrator is responsible for compliance of the system with the EMC directive and standard EN 61800-3: 2004 Category C2.

Warning

- If applied in the first environment, the AC drive may generate radio interference. Besides them CEcompliance described in this chapter, users must take measures to avoid such interference, if necessary.

7.3 Selection of Peripheral EMC Devices

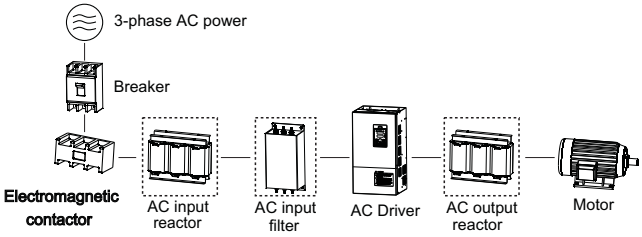


Figure7-1 EMC external fittings installation diagram

7.3.1 Power Input Installed EMC Input Filter

An EMC filter installed between the AC drive and the power supply can not only restrict the interference of electromagnetic noise in the surrounding environment on the AC drive, but also prevents the interference from the AC drive on the surrounding equipment.The HD500 series AC drive satisfies the requirements of category C2 only with an EMC filter installed on the power input side.

Note:

1. Strictly comply with the ratings when using the EMC filter. The EMC filter is category I electric apparatus, and therefore, the metal housing ground of the filter should be in good contact with the metal ground of the installation cabinet on a large area, and requires good conductive continuity. Otherwise, it will result in electric shock or poor EMC effect.

2. The ground of the EMC filter and the PE conductor of the AC drive must be tied to the same common ground. Otherwise, the EMC effect will be affected seriously.

3. The EMC filter should be installed as closely as possible to the power input side of the AC drive.

7.3.1.1 Standard EMC Fliter

The following table lists the recommended manufactures and models of EMC filters for the HD500 series AC drive. Selecting a proper one based on actual requirements.

Recommended Manufacturers and Models of EMC Input Filters

AC drive Model	Input AC Filter Model	Input AC Filter Model（SCHAF0FNER）
HD500-4T-18.5G	50EBK5 FN 3258	55
HD500-4T-22G	65EBK5 FN 3258	75
HD500-4T-30G	65EBK5 FN 3258	75
HD500-4T-37G	80EBK5 FN 3258	100
HD500-4T-45G	100EBK5 FN 3258	100
HD500-4T-55G	130EBK5 FN 3258	130
HD500-4T-75G	160EBK5 FN 3258	180
HD500-4T-90G	200EBK5 FN 3258	180
HD500-4T-110G	250EBK5 FN 3270H	250

7.3.1 .2 Simple Filter

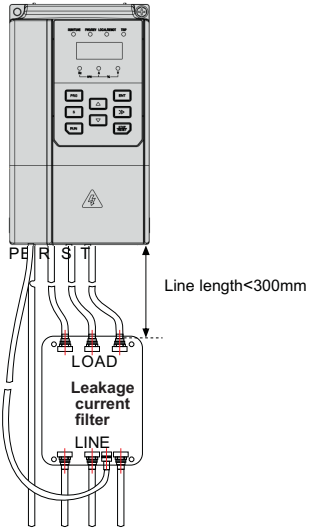


Figure7-2 Simple filter installation diagram

Simple Filter Selection Table

AC drive Model	Input Simple Filter Model	Filter Rated Current A	Outline Dimension Dx Wx H(mm)	Installation DimensionDxW(mm)
HD500-4T-18.5G	DL65EB1/10	65	218x140x80	184x112
HD500-4T-22G				
HD500-4T-30G				

AC drive Model	Input Simple Filter Model	Filter Rated Current A	Outline Dimension Dx Wx H(mm)	Installation DimensionDxW(mm)
HD500-4T-37G	DL-120EB1/10	120	334x185x90	304x155
HD500-4T-45G				
HD500-4T-55G				
HD500-4T-75G	DL-180EB1/10	180	388x220x100	354x190
HD500-4T-90G				
HD500-4T-110G	Without			

Simple filter outline and installation dimension as follow:

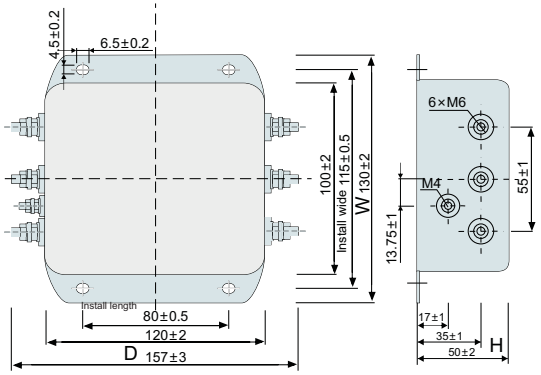


Figure 7-3 Simple Filter Outline and Installation Dimension Figure

7.3.1.3 Amorphous Magnetic Ring (Common mode choke/ Zero phase reactor)

Figure 7-4 Amorphous magnetic ring appearance

Recommended model table as follow, please select the appropriate magnetic ring comply to the specification of the input and output cable:

Recommended Manufacturers and Models of EMC Input Filters

Ring Manufacturers Model	Dimension OD×ID×T
DY644020H	64×40×20
DY805020H	80×50×20
DY1207030H	120×70×30

7.3.2 Installation of AC Input Reactor on Power Input Side

An AC input reactor is installed to eliminate the harmonics of the input current. As an optional device, the reactor can be installed externally to meet strict requirements of an application environment for harmonics. The following table lists the recommended manufacturers and models of input reactors.

Recommended manufacturers and models of AC input reactors

AC drive Model	AC Input Reactor Model	Rated I Input Current A
HD500-4T-18.5G	SD-ACL-50-4T-183-2%	50
HD500-4T-22G	SD-ACL-80-4T-303-2%	80
HD500-4T-30G	SD-ACL-80-4T-303-2%	80
HD500-4T-37G	SD-ACL-80-4T-303-2%	80
HD500-4T-45G	SD-ACL-120-4T-453-2%	120
HD500-4T-55G	SD-ACL-120-4T-453-2%	120
HD500-4T-75G	SD-ACL-200-4T-753-2%	200
HD500-4T-90G	SD-ACL-200-4T-753-2%	200
HD500-4T-110G	SD-ACL-250-4T-114-2%	250

7.3.3 Installation of AC Output Reactor on Power Output Side

Whether to install an AC output reactor on the power output side is dependent on the actual situation. The cable connecting the AC drive and the motor should not be too long; capacitance enlarges when an over-long cable is used and thus high-harmonics current may be easily generated.

If the length of the output cable is equal to or greater than the value in the following table, install an AC output reactor on the power output side of the AC drive.

Cable length threshold when an AC output reactor is installed

AC drive power(kW)	Rated voltage(V)	Cable minimum length(m)
4	200~500	50
5.5	200~500	70

AC drive power(kW)	Rated voltage(V)	Cable minimum length(m)
7.5	200~500	100
11	200~500	110
15	200~500	125
18.5	200~500	135
22	200~500	150
≥30	200~690	150

AC output reactor models Recommended models listed below:

Recommended manufacturer and models of AC output reactors

AC drive Model	AC Input Reactor Model	Rated I Input Current A
HD500-4T-18.5G	SD-OCL-50-4T-183-1%	50
HD500-4T-22G	SD-OCL-60-4T-223-1%	80
HD500-4T-30G	SD-OCL-80-4T-303-1%	80
HD500-4T-37G	SD-OCL-90-4T-373-1%	90
HD500-4T-45G	SD-OCL-120-4T-453-1%	120
HD500-4T-55G	SD-OCL-150-4T-553-1%	150
HD500-4T-75G	SD-OCL-200-4T-753-1%	200
HD500-4T-90G	SD-OCL-250-4T-114-1%	250
HD500-4T-110G	SD-OCL-250-4T-114-1%	250

7.4 Shielded Cable

7.4.1 Requirements for Shielded Cable

The shielded cable must be used to satisfy the EMC requirements of CE marking. Shielded cables are classified into three-conductor cable and four-conductor cable. If conductivity of the cable shield is not sufficient, add an independent PE cable, or use a four-conductor cable, of which one phase conductor is PE cable.

The three-conductor cable and four-conductor are shown in the following figure:

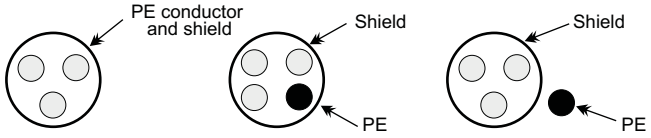


Figure 7-5 Shielded cable with shielding

To suppress emission and conduction of the radio frequency interference effectively, the shield of the shielded cable is cooper braid. The braided density of the cooper braid should be greater than 90% to enhance the shield-ing efficiency and conductivity, as shown in the following figure.

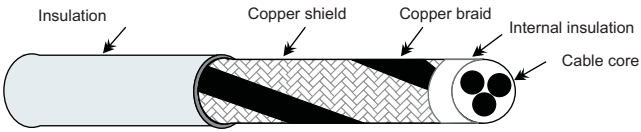
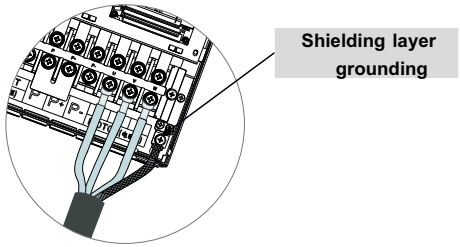


Figure 7-6 Shielded cable with shielding

The following figure shows the grounding method of the shielded cable:



Note:

1. Symmetrical shielded cable is recommended. The four-conductor shielded cable can also be used as an input cable.

2. The motor cable and PE shielded conducting wire (twisted shielded) should be as short as possible to reduce electromagnetic radiation and external stray current and capacitive current of the cable. If the motor cable is over 100 meters long, an output filter or reactor is required.

3. It is recommended that all control cables be shielded.

4. It is recommended that a shielded cable be used as the output power cable of the AC drive; the cable shield must be well grounded. For devices suffering from interference, shielded twisted pair (STP) cable is recommended as the lead wire and the cable shield must be well grounded.

7.4.2 Cabling Requirements

1. The motor cables must be laid far away from other cables. The motor cables of several AC drives can be laid side by side.

2. It is recommended that the motor cables, power input cables and control cables be laid in different ducts. To avoid electromagnetic interference caused by rapid change of the

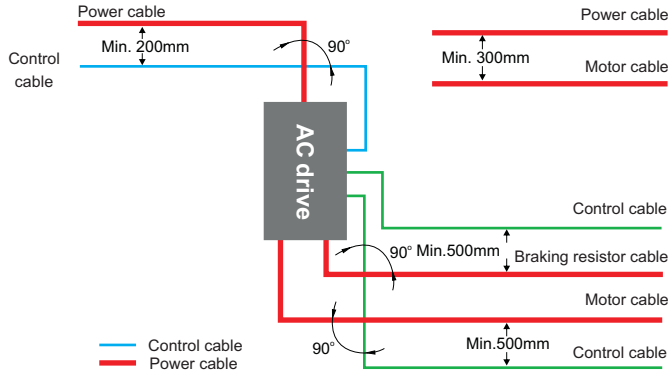
output voltage of the AC drive, the motor cables and other cables must not be laid side by side for a long distance.

3. If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90°. Other cables must not run across the AC drive.

4. The power input and output cables of the AC drive and weak-current signal cables(such as control cable) should be laid vertically (if possible) rather than in parallel.

5. The cable ducts must be in good connection and well grounded. Aluminium ducts canbe used to improve electric potential.

6. The filter, AC drive and motor should be connected to the system (machinery or appliance) properly, with spraying protection at the installation part and conductive metal in full contact.



7.5 Requirement for Leakage Current

1. Since the output of AC drive is high-speed pulse voltage, thereby will generate high-frequency leakage current. To prevent electric shock and fire-induced leakage, please install the AC drive leakage circuit breaker.

2. Each of the AC drive generate mare than 100mA leakage current, therefore leakage breaker sensitivity current should choose over 100mA.

3. High-frequency pulse interference may cause leakage circuit breaker malfunction after receiving interference, it should choose a high-frequency filter leakage circuit breaker.

4. If install several AC drives, each AC drive should provide a leakage circuit breaker.

5. Factors affecting the leakage current as follows:

- The capacity of the AC drive.
- The carrier frequency.
- Type and length of cable.
- EMI filter.

6. When the leakage current of the AC drive cause leakage circuit breakers, should operate as follows:

- Improving leakage breaker sensitivity current value.
- Replacing high-frequency leakage circuit breaker inhibition.
- Reducing the carrier frequency.
- Shorten the output cable lengths.
- Install leakage suppression equipment.
- Optional EMC filter suppresses the leakage current, specific selection guide refer to.

7.6 Solutions to Common EMC Interference Problems

The AC drive generates very strong interference. Although EMC measures are taken, the interference may still exist due to improper cabling or grounding during use. When the AC drive interferes with other devices, adopt the following solutions.

EMC interference problems and treatment methods

Interference Type	Treatment methods
Leakage protection switch trips	+ Connect the motor housing to the PE of the AC drive. + Connect the PE of the AC drive to the PE of the mains power supply. + Add a safety capacitor to the power input cable. + Add magnetic rings to the input drive cable.
AC drive interference during running	+ Connect the motor housing to the PE of the AC drive. + Connect the PE of the AC drive to the PE of the mains voltage. + Add a safety capacitor to the power input cable and wind the cable with magnetic rings. + Add a safety capacitor to the interfered signal port or wind the signal cable with magnetic rings. + Connect the equipment to the common ground.
Communication interference	+ Connect the motor housing to the PE of the AC drive + Connect the PE of the AC drive to the PE of the mains voltage. + Add a safety capacitor to the power input cable and wind the cable with magnetic rings. + Add a matching resistor between the communication cable source and the load side. + Add a common grounding cable besides the communication cable. + Use a shielded cable as the communication cable and connect the cable shield to the common grounding point.
I/O interference	+ Enlarge the capacitance at the low-speed DI. A maximum of 0.11 uF capacitance is suggested. + Enlarge the capacitance at the AI. A maximum of 0.22 uF is suggested.

Chapter 8

Troubleshooting and Maintenance

8.1 Daily Repair and Maintenance

8.1.1 Daily Maintenance

Ambient temperature, humidity, dust and vibration will affect the aging of the devices in the AC drive, which may cause potential faults or reduce the service life of the AC drive. Therefore, it is necessary for daily and periodic maintenance.

Daily maintenance involves:

1. Whether the motor sounds abnormally during running.
2. Whether the motor vibrates excessively during running.
3. Whether the installation environment of the AC drive changes.
4. Whether the AC drive's cooling fan works normally.
5. Whether the AC drive overheats.

Routine cleaning involves:

1. Keep the AC drive clean all the time.
2. Remove the dust, especially metal powder on the surface of the AC drive, to prevent the dust from entering the AC drive.
3. Clear the oil stain on the cooling fan of the AC drive.

8.1.2 Periodic Inspection

Perform periodic inspection in places where inspection is difficult.

Periodic inspection involves:

1. Check and clean the air duct periodically.
2. Check whether the screws become loose.
3. Check whether the AC drive is corroded.
4. Check wether the wiring terminals show signs of arcing.
5. Main circuit insulation teat.

Note:

Before measuring the insulating resistance with megameter (500VDC megameter recommended), disconnected the main circuit from the AC drive. Do not use the insulating resistance meter to test the insulation of the control circuit. The high voltage test need not be performed again because it has been completed before delivery.

8.1.3 Replacement of Vulnerable Components

The vulnerable components of the AC drive are cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance status. Generally, the service life is shown as follows:

Component	Service Life
Fan	2~3 years
Electrolytic capacitor	4~5 years

Note:

The standard replace time is the following using time, users can confirm the replace use age comply to the running time.

- Environment temperature: The annual average temperature is about 30 degrees.
- Overload ratio: Under 80%.
- Running ratio: Under 20 hours per day.

1. Cooling fan

- Possible damage reason: Bearing worn, blade aging.
- Judging criteria: Whether there are crack on the blade and abnormal vibration noise upon startup.

2. Filter electrolytic capacitor

- Possible damage reason: Input power supply, high ambient temperature, frequency load jumping, electrolytic aging.
- Judging criteria: Whether there is liquid leakage and safe valve has projected. Measure the static capacitance and insulating resistance.

8.1.4 Storage of the AC drive

For storage of the AC drive, pay attention to the following two aspects.

1. Pack the AC drive with the original packing box provided by Our company.
2. Long-term storage degrades the electrolytic capacitor. Thus, the AC drive must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

8.2 Warranty Agreement

1. Free warranty only applies to the AC drive itself.
2. Our company provides 18-momth warranty (starting from the leave-factory date as indicated on the bar code) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.
3. Reasonable repair expense will be charged for the damages due to the following causes:
   a. Improper operation without following the instructions.
   b. Fire, flood or abnormal voltage.
   c. Using the AC drive for non-recommended function.
4. The maintenance fee is charged according to Our company's uniform standard. If there is an agreement, the agreement prevails.

8.3 Contents of This Chapter

This chapter tells how to rest faults and view fault history. It also lists all alarm and fault messages including the possible cause and corrective actions.

Danger

- Only qualified electricians are allowed to maintain the AC drive. Read the safety instruction in chapter safety precaution before working on the AC drive.

8.4 Alarm and Fault Indications

Faults is indicated by LEDs. Seeing Operation Procedure. When TPIP light is on, an alarm or fault message on the panel display indicates abnormal AC drive state. Using the information given in this chapter, most alarm and fault cause can be identified and corrected. If not, contact with the Our company.

8.5 Fault Reset

The AC drive can be reset by pressing the Keypad STOP/RESET, through digital input, or by switching the power light. When the fault has been removed, the motor can be restarted.

8.6 Fault History

Function codes F07.20~F07.25 store 6 recent faults. Function codes F07.26~F07.33,F07.34~F07.41, F07.42~F07.49 show drive operation date at the time the latest 3 faults occurred.

8.7 Fault Instruction and Solution

Instructions as follows when the AC drive is in fault:

1. Check to whether the Keypad display is wrong or not. If not, please contact with the local Our company office.

2. If nothing wrong, please check F07 and ensure the corresponding recorded fault parameters to confirm the real state when the current fault occurs by all parameters.

3. Seeing the following table for detailed solution and check the corresponding abnormal state.

4. Eliminate the fault and ask for relative technicians for help.

5 Check to eliminate the fault and carry out reset to run the AC drive.

No.	Code	Fault	Cause	Solution
1	E.out 1	IGBT U phase protection	♦ The acceleration is too fast . ♦ There is damage to the internal to IGBT of the phase. ♦ The connection of the driving wires and the grounding is not good.	♦ Increase Acc time. ♦ Change the power unit. ♦ Check the driving wires. ♦ Check if there is strong interference to the external equipment
2	E.out 2	IGBT V phase protection		
3	E.out 3	IGBT W phase protection		
4	E.oc 1	Accelerating overcurrent	♦ The acceleration or deceleration is too fast. ♦ The voltage of the grid is too low. ♦ The power of the AC drive is too low. ♦ The load transient or abnormal. ♦ The grounding is short circuited or the output is phase loss. ♦ There is strong external interference.	♦ Increase the Acc time. ♦ Check the input power. ♦ Select the AC drive with a large power. ♦ Check if the load is short circuited(the grounding short circuited) or the rotation is not smooth. ♦ Check the output configuration. ♦ Check if there is strong interference.
5	E.oc 2	Accelerating overcurrent		
6	E.oc 3	Accelerating overcurrent		
7	E.ou 1	Accelerating overvoltage	♦ The input voltage is abnormal. ♦ There is large energy feedback.	♦ Check the input power. ♦ Check if the DEC time of the load is too short or the AC drive starts during the rotation of the motor or it needs to increase the energy consumption components.
8	E.ou 2	Decelerating overvoltage		
9	E.ou 3	Constant overvoltage		
10	E.LU	Bus undervoltage fault	♦ The voltage of the power supply is too low.	♦ Check the input power of the supply line.
11	E. ol 1	Motor overload	♦ The voltage of the power supply is too low.	♦ Check the input power of the supply line.
12	E. ol 2	Invertor overload	♦ The acceleration is too fast. ♦ Reset the rotating motor. ♦The voltage of the power supply is too low. ♦ The load is too heavy.	♦ Increase the Acc time. ♦ Avoid the restarting after stopping. ♦ Check the power of the supply line, ♦ Select an AC drive with bigger power, ♦ Select a proper motor.
13	E.SPI	Input phase loss	♦ Phase loss or fluctuation of input R,S,T.	♦ Check input power
14	E.SPO	Output phase loss	♦ U,V,W phase loss input (or serious asymmetrical three phase of the load)	♦ Check input power
15	E,OH1	Rectifying module overheated	♦ Air duct jam or fan damage.	♦ Check input power

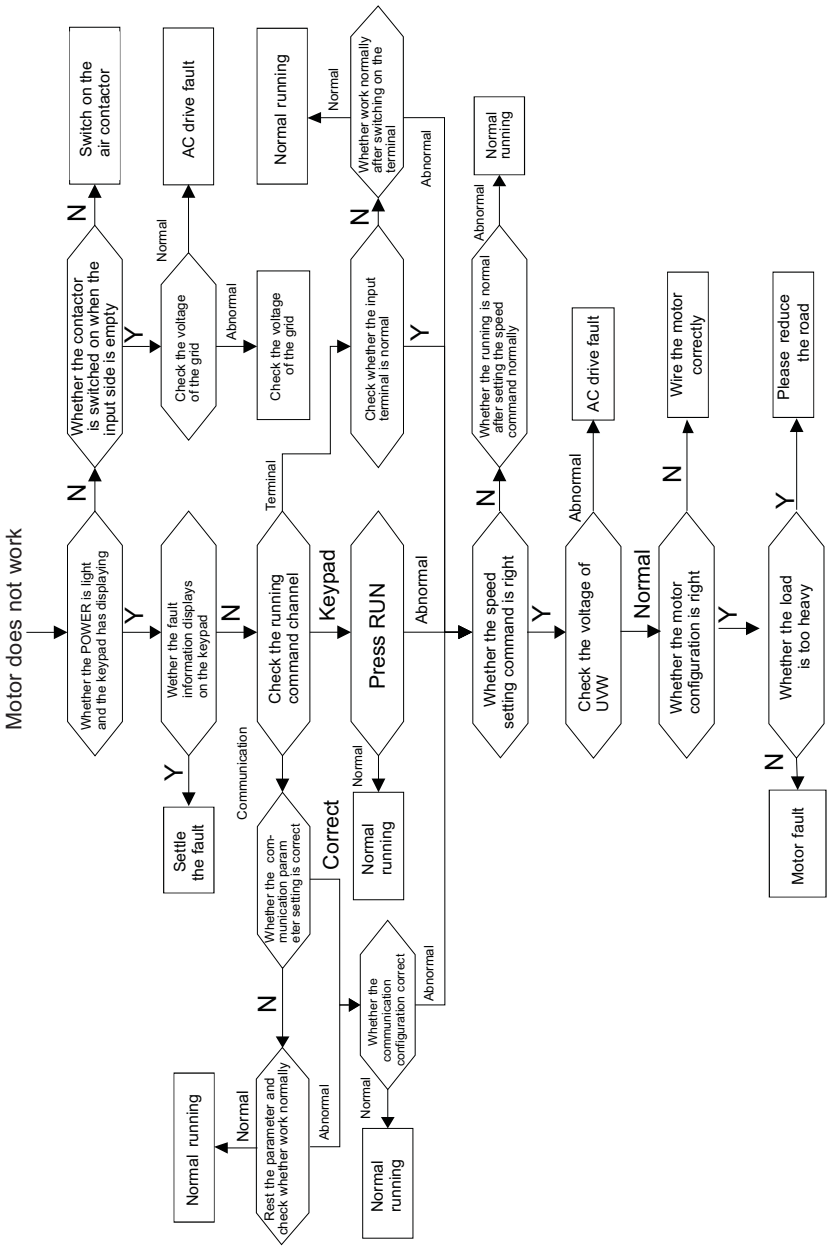
No.	Code	Fault	Cause	Solution
16	E,OH2	IGBT overheated	♦ Ambient temperature is too high. ♦ The time of overload running is too long	♦ Check input power
17	E.EF	External fault	♦ SI external fault input terminals action.	♦ Check input power
18	E.CF	485 communication fault	♦ The baud rate setting is incorrect. ♦ Fault occurs to the communication wiring. ♦ The communication address is wrong. ♦ There is strong interference to the communication.	♦ Set proper baud rate. ♦ Check the communication connection distribution. ♦ Set proper communication address. ♦ Change or replace the connection distribution or improve the anti-interference capability.
19	E.LCE	Current-detecting fault	♦ The connection of the control board is not good. ♦ Hoare components is broken ♦ The modifying circuit is abnormal.	♦ Check the connector and repatch. ♦ Change the hoare. ♦ Change the main panel.
20	E.TUE	Motor-autotuning fault	♦ The motor capacity does not comply with the AC drive capability. ♦ The rated parameter of the motor does not set correctly. ♦ The offset between the parameters from autotune and the standard parameter is huge. ♦Autotune overtime.	♦ Check the connector and repatch. ♦ Change the hoare. ♦ Change the main panel.
19	E.LCE	Current-detecting fault	♦ The connection of the control board is not good. ♦ Hoare components is broken ♦ The modifying circuit is abnormal.	♦ Check the connector and repatch. ♦ Change the hoare. ♦ Change the main panel.
20	E.TUE	Motor-autotuning fault	♦ The motor capacity does not comply with the AC drive capability. ♦ The rated parameter of the motor does not set correctly. ♦ The offset between the parameters from autotune and the standard parameter is huge. ♦ Autotune overtime.	♦ Change the AC drive mode. ♦ Set the rated parameter according to the motor name plate. ♦ Empty the motor load and reindentify. ♦ Check the motor connection and set the parameter.
21	E.EEP	EEPROM operation fault	♦ Error of controlling the write and read of the parameters. ♦ Damage to EEPROM.	♦ Press STOP/RESET to reset. ♦ Change the main control panel.
22	E.PID	PID feedback outline fault	♦ PID feedback offline. ♦ PID feedback source disappear.	♦ Check the PID feedback signal. ♦ Check the PID feedback source.
23	E.BRE	Braking circuit fault	♦ Braking circuit fault or damage to the braking popes. ♦ The external braking resistor is not sufficient.	♦ Check the braking unit and change new braking pipe. ♦ Increase the braking resistor.
24	E.End	Running time arrival	♦ The actual running time of the AC drive is above the internal setting running time.	♦ Ask for the supplier and adjust the setting running time.

No.	Code	Fault	Cause	Solution
25	E.oL3	Electronic overload fault	♦ The AC drive will report the overload pre-alarm according to the set value.	♦ Check the load and the overload pre-alarm point.
26	E.PCE	Keypad communication fault	♦ The connection of the Keypad wires is not good or broken. ♦ The Keypad wire is too long and affected by strong interference. ♦ There is circuit fault on the communication of the Keypad and main board	♦ Check the Keypad wires and ensure whether there is mistake. ♦ Check the environment and avoid the interference source. ♦ Change the hardware and ask for service.
27	E.UPE	Parameters uploadingfault	♦ The connection of the keypad wiresis not good or broken. ♦ The keypad wire is too long and affected by strong interference. ♦ Ensure keypad whether support copy function	♦ Check the keypad wires and ensure whether there is mistake. ♦ Change the hardware and ask for service ♦ Change the hardware and ask for service
28	E.DnE	Parameters uploadingfault	♦ The connection of the keypad wires is not good or broken. ♦ The keypad wire is too long and affected by strong interference. ♦ Ensure download parameter version whether same with the control panel software version ♦ Ensure keypad whether repack-up parameter	♦ Check the keypad wires and ensure whether there is mistake. ♦ Change the hardware and ask for service ♦ Repack-up the data in the keypad ♦ Ensure both version are the same before download, please check A2.35 whether same with F07.10
29	E.ErH1	Grounding shortcut fault 1	♦ The output of the AC drive is short circuited with the ground. ♦ There is fault in the current detection circuit.	♦ The output of the AC drive is short circuited with the ground. ♦ There is fault in the current detection circuit.
30	E.ErH2	Grounding shortcut fault 2	♦ The output of the AC drive is short circuited with the ground. ♦ There is fault in the current detection circuit.	♦ The output of the AC drive is short circuited with the ground. ♦ There is fault in the current detection circuit.
31	E.dEu	Speed deviation fault	♦ The load is too heavy or stalled.	♦ Check the load and ensure it is normal. Increase the detection time. ♦ Check whether the control parameters are normal.
32	E.STo	Maladjustment fault	♦The control parameters of the synchronous motors not set properly. ♦ The autoturn parameter is not right. ♦ The AC drive is not connected to the motor.	♦ Check the load and ensure it is normal. ♦ Check whether the control parameter is set properly or not. ♦ Increase the maladjustment detection time.

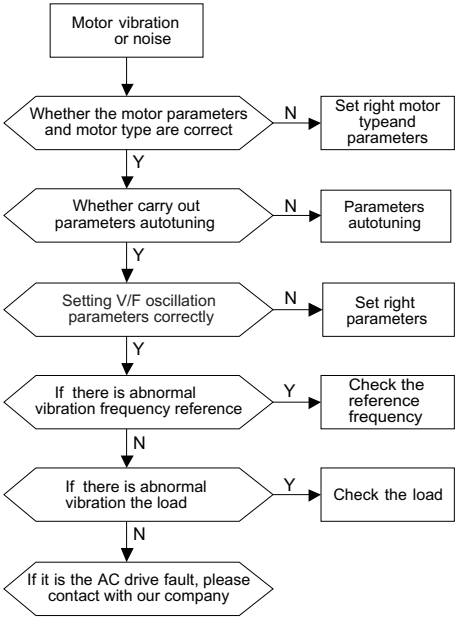
No.	Code	Fault	Cause	Solution
33	E.Esd1	Encoder disconnect fault	♦ Closed loop control, encoder signal disconnect. ♦ Encoder damage.	♦ Check encoder connection, reconnected circuit. ♦ Check whether the encoder is input or output.
34	E.Ecd2	Encoder reverse fault	♦ Closed loop control, encoder disconnection, damage or connect fault.	♦ Check encoder connection, adjust wiring.
35	E.Ptc	Motor overheated fault	♦ Motor long-term overload running or abnormal, temperature detect resistance. ♦ Motor overheated improper protection point.	♦ Check the motor and maintain. ♦ Check whether normal the temperature sensor. ♦ Reset the motor overheated protection point.
36	E.LL	Electronic underload fault	♦ The AC drive will report the underload pre-alarm according to the set value.	♦ Check the load and the underload pre-alarm point.
37	E.dp	Dp Communication Fault	♦ Improper setting of baud rate, ♦ Communication line fault, ♦ Wrong communication address, ♦ Strong interference towards communication	♦ Set proper baud rate. ♦ check the interface line of communication. ♦ set correct communication address. ♦ change or replace the line to improve the ability to resist the interference.
38	E.cAN	Can Communication fault	♦ Improper setting of baud rate, ♦ Communication line fault, ♦ Wrong communication address, ♦ Strong interference towards communication	♦ Set proper baud rate. ♦ check the interface line of communication. ♦ set correct communication address. ♦ change or replace the line to improve the ability to resist the interference.

8.8 Common Fault Analysis

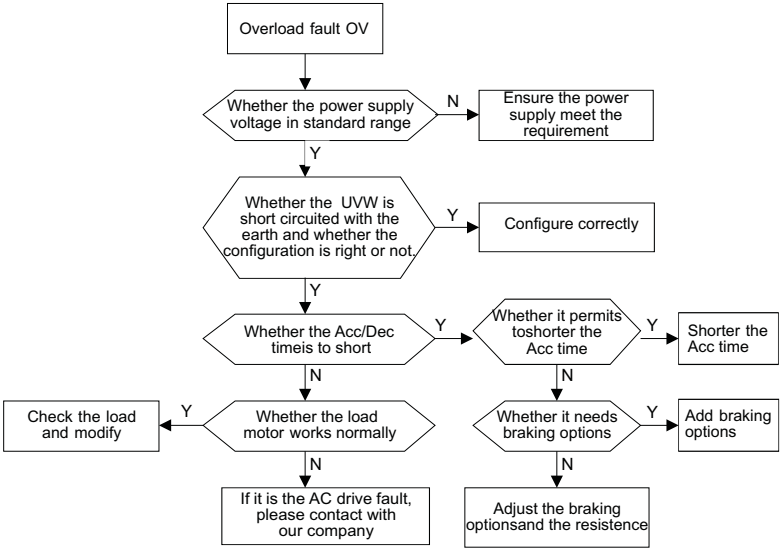
8.8.1 The Motor does not Work



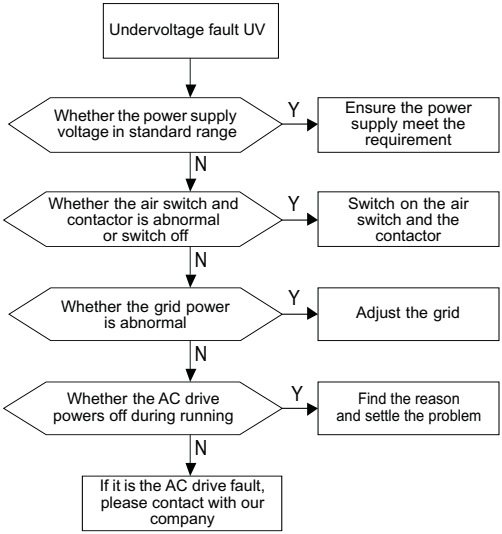
8.8.2 Motor Vibration



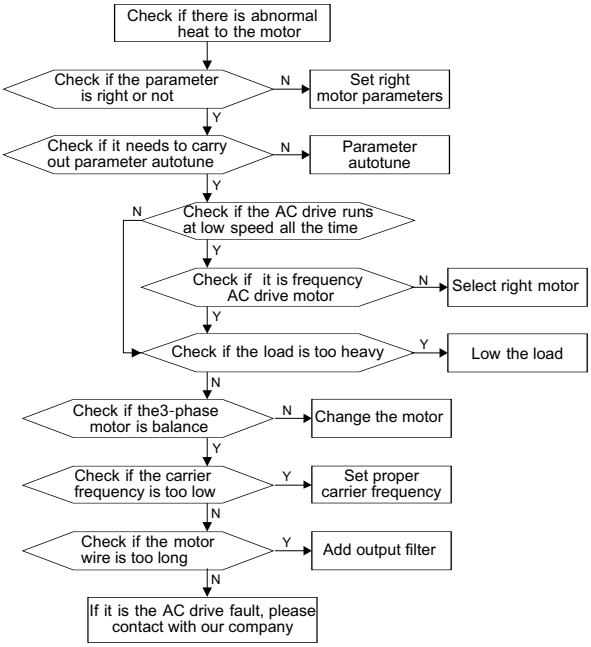
8.8.3 Overvoltage



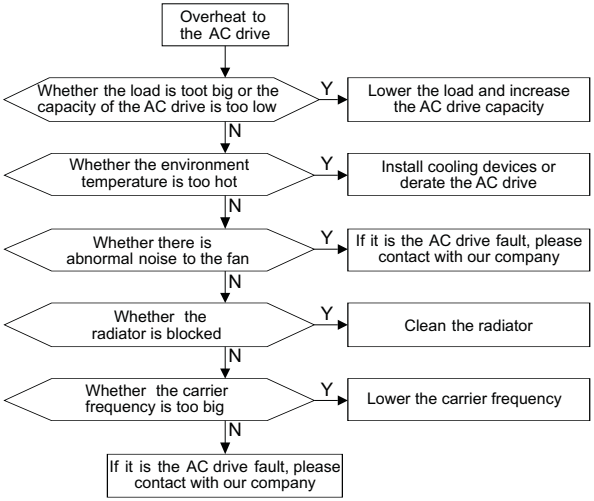
8.8.4 Undervoltage Fault



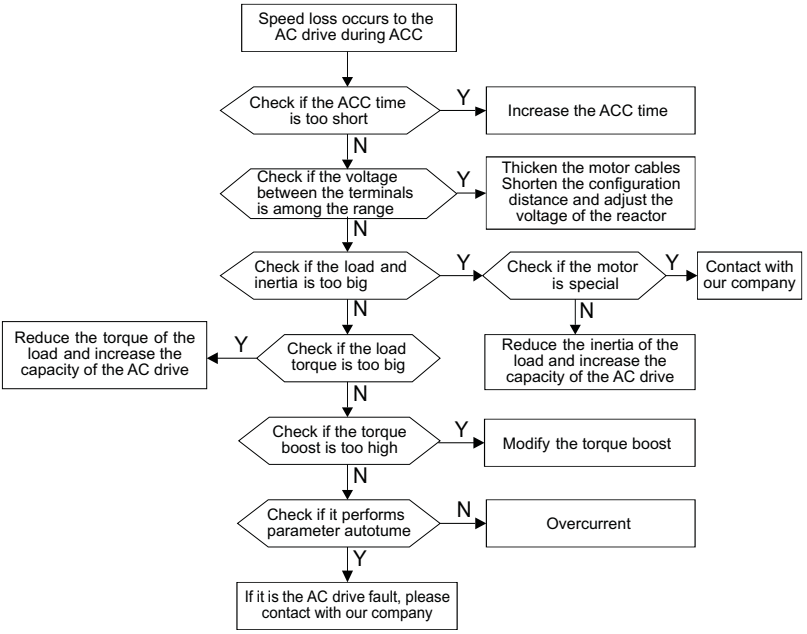
8.8.5 Abnormal Heating of the Motor



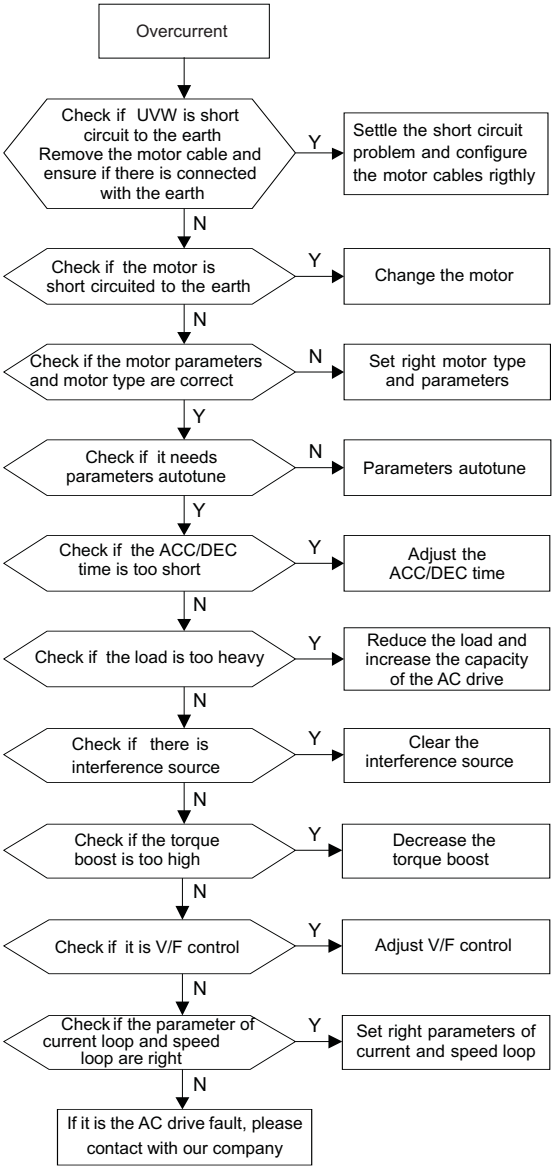
8.8.6 Overheat of the AC drive



8.8.7 Motor Stall During ACC



8.8.8 Overcurrent



Chapter 9

Communication Protocol

9.1 Networking Mode

AC drive in the network mode has two types: single host/multiple slaves mode and single host/slave mode.

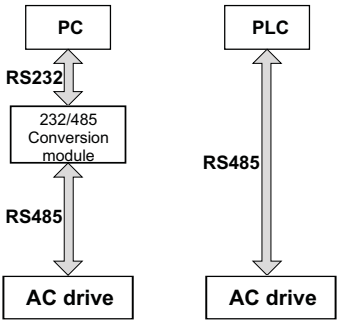


Figure 9-1 Single host/slave networking way

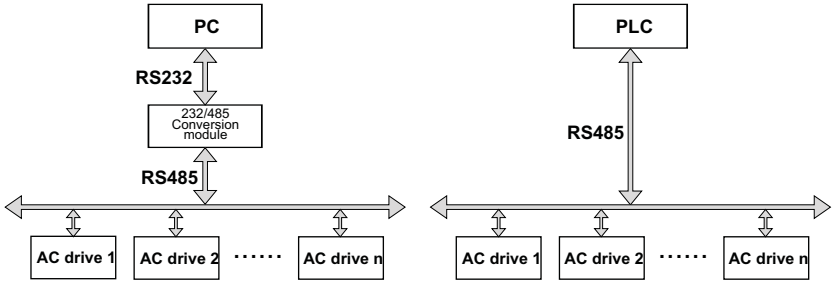


Figure 9-2 Single host/Multiple slaves networking way

9.2 Interface Mode

RS485: Asynchronous, half duplex.

The default data format: E-8-1 (parity, 8 data bits, 1 end bit), 19200 BPS. Communication parameter settings refer to F0E functional groups.

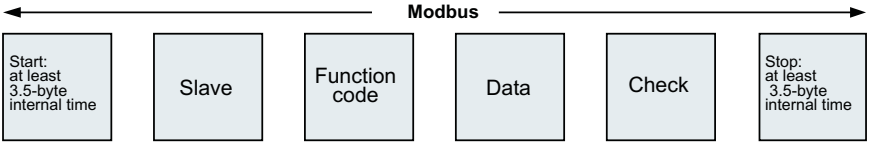
9.3 Protocol Frame Format

MODBUS protocol includes two kinds of transmission mode (RTU and ASCII mode), the AC drive only support RTU mode, the corresponding data such as the following:
Communication of bytes: 1 start bit, 8 data bits, check bit and end bit. When check digit, 1parity/odd check bit or end bit. When there is no parity bit, the 2 end bits are existent.

Start bit	BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	Check bit	Stop bit

In the RTU mode, a new frame is always at least 3.5 bytes transmission time interval as a start. Transmission of the data fields in the order: bundle machine address, operation command code, data and CRC check word.Transmission of each byte is hexadecimal. The data frame format as follows:

RTU Data Frame Format



1.The head of frame and tail frame through the bus free time greater than or equal to 3.5 bytes defined time frame.
2.Clearance between frame after the start, character must be smaller than 1.5 characters communication time, otherwise the new receiving characters will be treated as new format head.

3.Data validation sample CRC - 16, the information involved in check, calibration and the level of bytes to be exchanged after sending.

4.Frame to keep at least 3.5 characters of bus idle time, frame between bus free don't need to accumulate start and end free.

9.4 Function Protocol

1.Read a single or multiple data（0x03）

ADDR	xx
CMD	0x03
High bit of the start	xx
Low bit of the start	xx
High bit of data number	xx
Low bit of data number	xx
Check low bit of CRC	xx
Check high bit of CRC	xx

Read data：Slave responding frame

ADDR	xx
CMD	0x03
Byte number N*2	N*2
High bit of data 1	xx
Low bit of data 1	xx
.....	xx
High bit of data N	xx
Low bit of data N	xx
Check low bit of CRC	xx
Check high bit of CRC	xx

2. Write a single data（0x06）

ADDR	xx
CMD	0x06
High bit of register Add.	xx
Low bit of register Add.	xx
High bit of write data	xx
Low bit of write data	xx
Check low bit of CRC	xx
Check high bit of CRC	xx

Write data response :

ADDR	xx
CMD	0x06
High bit of register Add.	xx
Low bit of register Add.	xx
High bit of write data	xx
Low bit of write data	xx
Check low bit of CRC	xx
Check high bit of CRC	xx

3. Host broadcast frequency and start-stop command(0X20)

ADDR	xx
CMD	0x20
High bit of start-stop commandXX	xx
Low bit of start-stop command XX	xx
High bit of setting frequency value XX	xx
Low bit of setting frequencyvalue XX	xx
Check low bit of CRC	xx
Check high bit of CRC	xx

4. The error message response

Sometimes, errors occurs during the process of the communication. For example, reading or writing data to an illegal address, etc., then the slave will not work as a normal read-write response to reply the host, but send a wrong message frame. Error message frame format is as follows, where the command code is the result of the operation between highest-bit (Bit 7) of host operation and 1 (read error is 0x83 / write error is 0x86).

ADDR	xx
CMD	0x83 or 0x86
Error code	xx
Check low bit of CRC	xx
Check high bit of CRC	xx

The error code define as follows:

Error Code	Error Name	Descriptions
0x01	Illegal CMD	Slave received command code is illegal or does not exist
0x02	Illegal Data Add	Slave receives operation addis cross-border operation or illegal
0x03	Illegal Data	Slave received data is not within the scope of the function or the range set by other functional limitations is illegal.
0x04	Operation failed	Write operating parameters, set for the function is invalid, for example, the function of the input terminals can not duplicate definition
0x05	Password error	Written password is different from password set by the user
0x06	Data frame error	Slave received data frame length is incorrect or CRC checksum and other frames can not be wrong
0x07	Parameters only for read	Slave received the function of the write operation parameters as read-only
0x08	Parameters can not be changed during running	Slave in operation of the received write operation functions do not modify theparameters in running
0x09	Password protection	Slave has set up a user's password, and failed to pass the password authentication

4. CRC check

By using RTU frame format , the message contains error detect field that bases on CRC method. CRC field detects the whole message data. The CRC field is two bytes, including 16 figure binary values. It is calculated by transmission equipment and then added to the message. The receiving device recalculates the CRC of the received frame and compares them with the value in the received CRC field. If the two value are different, there is an error in the communication.

CRC saves 6-bit to CRC register at first. And then, deal with the continuous 8-bit byte of the message and the current value of the register by transferring one process. Only the 8 bit data of every character is valid for CRC, while the start bit, the end and the odd-even check bit are all invalid.

During the CRC process : every bit character is single exclusive or (XOR) with the CRC register data , the result moves to the lowest valid bit , the highest valid bit is filled with 0. LSB is distilled and detected , if LSB is 1, the CRC register is single exclusive with preset value, if LSB is 0, nothing happens. The whole process needs to repeat for 8 times. When the last bit finished, the next 8-bit byte character is single exclusive with the CRC register current value. The ultima CRC register value is the value since all the byte of the message has been performed .


```
unsigned int crc_cal_value(unsigned char*data_value,unsigned char dta_length)
(
  int i
  unsigned int crc_value=0xffff
  while(data_length--)
```

```
  crc_value^=*data_value++
  for(i=0;i<8,i++)
(
  if(crc_value&0x0001) crc_value=(crc_value>>1)^0xa001
        else  crc_value=crc_value>>1
)
)
  return(crc_value)
)
```

9.5 Communication Parameters Address

MODBUS communication includes read and write functions of the parameters of the operation of some special registers read and write operations, which include the control register, set register, state register and factory information.

9.5.1 The Definition of Communication Parameter Add.

The function code number and parameter label is the representation rule of the parameter address.

High byte: F00-F0E（F group）、A00-A03（A group）

Low byte: : 00-FF Low byte:

For example, to access F04.13, the access address of the parameter is 0xF40D ;

Function code group	Absolute Add.	Function code group	Absolute Add.
F0 Group	0x00	F1 Group	0x01
F2 Group	0x02	F3 Group	0x03
F4 Group	0x04	F5 Group	0x05
F6 Group	0x06	F7 Group	0x07
F8 Group	0x08	F9 Group	0x09
FA Group	0x0A	FB Group	0x0B
FC Group	0x0C	FD Group	0x0D
FE Group	0x0E	A0 Group	0x0F
A1 Group	0x10	A2 Group	0x11
A3 Group	0x12		

Note: Because EEPROM is frequently stored, it will reduce the life of EEPROM. Therefore, some parameters in the mode of communication don't need to store as long as change the value of RAM. Absolute address in the table corresponds to the high byte of RAM address, to achieve this function, as long as the absolute address can be done as address high byte.

For example：

The parameter F04.13 is stored in EEPROM , and the address is represented as 0xF40D ;

The parameter F04.13 is not stored in the EEPROM, and the address is represented as 0x040D ;

The parameter A01.12 is stored in EEPROM , and the address is represented as 0xA10C ;

The parameter A01.12 is not stored in the EEPROM, and the address is represented as 0x010C ;

Read of both EEPROM address and RAM address are valid.

When read the function code parameters, user can only read the maximum of 16 consecutive address parameters.more than 16, the AC drive will return the illegal data. When writing function parameter, each can only write a parameter. Users should pay attention to the setting value that cannot exceed the set range of function parameters.Function parameters set permissions and function code attributes related parameters, such as read-only parameter is not writable, the operation cannot be changed in the running also cannot be written. The password is set by the user, in the case without decryption, all of the parameters cannot write. User password and parameter autotune cannot via communication to write. Otherwise, the AC drive will return the fault information.

9.5.2 The Definition of the Special Register Address

Register	Function instruction	Add.	Setting instruction	R/W
Control register	Control register	2000H	0001H：Forward running 0002H：Reverse running 0003H：Forward jogging 0004H：Reverse jogging 0005H：Dcclerate stop 0006H: Coast to stop(emergency stop) 0007H：Fault reset 0008H：Jogging stop 0009H：Pre-exciting	W
Setting register	Setting frequency	3000H	0~Fmax (Unit：0.01Hz)	W
	PID reference	3001H	-1000~1000 (Correspond to -100.0%~100.0%)	W
	PID feedback	3002H	-1000~1000 (Correspond to -100.0%~100.0%)	W
	Torque setting	3003H	-3000~3000 (1000 corresponds to 100.0% o f the rated current of the motor)	W
	The upper limit frequency setting during forward rotation	3004H	0~Fmax (Unit：0.01Hz)	W
	The upper limit frequency setting during reverse rotation	3005H	0~Fmax (Unit：0.01Hz)	W
	The upper limit torque of electromotion torque	3006H	0~3000 (1000 corresponds to 100.0% of the current of the AC drive motor)	W

Register	Function instruction	Add.	Setting instruction	R/W
Setting register	The upper limit torque of braking torque	3007H	0~3000 (1000 corresponds to 100.0% of the current of the AC drive motor)	W
	Special control command	3008H	BIT0~1 : =00 : Motor 1 =01 : Motor 2 =10 : Motor3 BIT2 : =1 Torque control =0 : Speed control	W
	Virtual input terminal command	3009H	0x0000~0x00FF	W
	Virtual input terminal command	300AH	0x0000~0x00FF	W
	Voltage setting value	300BH	0~1000 (1000 corresponds to 100.0% of the rated voltage of the motor)	W
	AO 1 output setting	300CH	0~1000 (1000 corresponds to100.0%)	W
	AO 2 output setting	300DH	0~1000 (1000 corresponds to 100.0%)	W
State register	State register 1	6000H	0001H : Forward running 0002H : Reverse running 0003H : Stop 0004H : Fault 0005H : P.OFF state	R
	State register 2	6001H	BIT0: =0 : ready for operation =1 : not ready for operation BIT1 ~ BIT2 : =00 : motor 1 =01 : motor2 BIT3 : =0 : asynchronous motor =1 : synchronous motor BIT4 : =0 : pre-alarm without overload =1 : overload pre-alarm BIT5 ~ BIT6 : =00 : keypad control =01 : terminal control =10 : communication control	R
	Fault code	6002H	Read the register will return the last fault of the AC drive corresponding to the code. The fault code comply to 8.7 to receive the relate fault and other informations.	R
Factory Information	AC drive model	8000H	HD500-----0xD300	R
	Manufacturer bar code 1	8001H	Range : 0000~FFFF	R
	Manufacturer bar code 2	8002H	Range : 0000~FFFF	R
	Manufacturer bar code 3	8003H	Range : 0000~FFFF	R
	Manufacturer bar code 4	8004H	Range : 0000~FFFF	R
	Manufacturer bar code 5	8005H	Range : 0000~FFFF	R
	Manufacturer bar code 6	8006H	Range : 0000~FFFF	R

Note:

R characteristic can only read, write invalid and report the address error. W characteristic can only write. read invalid and report the address error.

9.5.3 The Definition of the Special Register Address

Control register

Control register belong to write register. A read command is sent to the register when the return value is 0. Through the register, the user can control AC drive to start/stop reset and fault. The control register only in F00.01 set communication operation command channel (3 or 4) write is effective.

Setting register

The group of the setting register belong to write register, the register group send a read command to return the value of 0.

Setting frequency

By writing to the register, the user can set the operating frequency of the AC drive. Setting range is 0~F00.03 (maximum frequency). In writing the registers, users should ensure that instructions for the frequency MODBUS mgiven way (or F00.07 F00.06 9) ,otherwise, it will returns an error message and settings will failure.

PID reference and feedback

By writing these two registers, the user can set PID given value and returns PID feedback value to achieve the corresponding process control, set the range -1000~1000 (corresponding to -100.0~100.0%). In write of the two registers, the user should ensure that instructions for the frequency PID reference way (F00.06 or F00.07 is set to 8), and PID given need guaranteed PID given source for the MODBUS (F09.00 is set to 6) and PID feedback to ensure that PID feedback source set for MODBUS (F09.02 is set to4), otherwise, it returns an error message and settings will failure, PID control related information, please refer to F09 group specified.

Torque setting

By writing these two register, the user can set the running torque of the AC drive. Setting range is -3000~3000(corresponding to -300.0~300.0%). User should ensure the AC drive control mode way is loop control(F00.00 is 1 or 2) when write this register, and the torque setting way is the MODBUS (A00.01 is 6), otherwise, it returns an error message and setting will failure. The related information of the torque control, please refer to A00 group function details instruction.

The upper limit frequency setting during forward and reverse rotation

By writing these two registers, the user can set the upper limit frequency setting during forward and reverse rotation. The setting range is 0~F00.03(maximun frequency). User should ensure the AC drive control mode way is loop control(F00.00 is 1 or 2) when write the two registers, and the torque control enable (A00.1 is 1) and the upper limit frequency setting during forward and reverse rotation setting way is the MODBUS (F03.11 or F03.12 is 5), otherwise, it returns an error message and setting will failure.

The upper limit torque of electromotion and braking torque

By writing these two registers, the user can set the upper limit torque of electromotion and braking torque.The setting range is 0~3000(corresponding to 0.0~300.0%). User should ensure the upper limit torque of electromotion and braking torque setting way is MODBUS(F03.11 or F03.12 is 5), when write the two registers,otherwise, it returns an error message and setting will failure.

Special control command

By writing this register, the user can switch the current motor parameter with speed and torque control. The setting range is BIT0~BIT1 is 0x00~0x01, BIT2 is 0x00~0x01.

Analog input and output terminal

By writing these two registers, the user can make some logic control via analog input and output terminal function. Virtual output terminal range is 0x00~0x0F. User should ensure virtual terminal setting is MODBUS(F05.11 is 1), otherwise, it returns an error message and setting will failure. At that time, the terminal input will be invalid, system only receive the input of the virtual input terminal as terminal function logic control.Virtual output terminal can write in any case and won't back to error message, but it only corresponds to output terminal select is MODBUS communication analog terminal (F03.01, F03.02, F06.03 or F06.04 is 23), the write analog output terminal register corresponds to the output terminal is valid.

Voltage setting value

By writing this register, the user can set the V/F control mode under the V/F curve for the custom value of the voltage. The setting range is 0~100(corresponding to 0.0~100.0%). User should ensure the voltage setting channel is MODBUS(F04.27 is 7), otherwise, it returns an error message and setting will failure.

The output analog setting 1 and 2

By writing these two registers, the user can set the output of the analog AO 1and AO 2 output, the range is0~1000(corresponding to 0.0~100.0%). User should ensure the analog output selection is MODBUS(F06.14 and F06.15 is 16 or 17), the corresponds output analog have output. It need to care is the output analog setting1 and 2 register as well as AO 1 with AO 2 is not correspond, but need to select set.

9

State register

The group state register is read-noly register, sending the write command will report illegal data address error code for this register group. User can read via the reorganization register know AC drive running state, control motor type, running command way and fault code informations.The fault code explanation refer to the chapter 8.

Factory information

The register group of the factory is read-only register, sending the write command will report illegal data address error code for this register group. User can via read the AC drive model register to receive the type of theAC drive, SD 300 model is 0xD300. The factory bar code is supply to the manufacturers to maintain records of the AC drive.

9.5.4 MODBUS Communication Illustration

It is assumed that the HD500 AC drive is set to the communication command control mode, MODBUS start AC drive with 30.00Hz frequency reverse running and observe the running state.

Firstly, setting AC drive to communication command control mode(F00.01 is set to 3), and the communicationchannel is set to MODBUS communication(F00.02 is set to o).

Host send: 01 06 00 01 00 03 98 0B
AC drive response: 01 06 00 01 00 03 98 0B

Host send: 01 06 00 02 00 00 28 0A
AC drive response: 01 06 00 02 00 00 28 0A

Secondly, setting AC drive running frequency command selection is MODBUS (F00.06 is set to 9), and the setting running frequency is 30.00Hz. When the 30.00 Hz communication, it setting value is 0x0BBB(decimal is 3000).

Host send: 01 06 00 06 00 09 A9 CD
AC drive response: 01 06 00 06 00 09 A9 CD

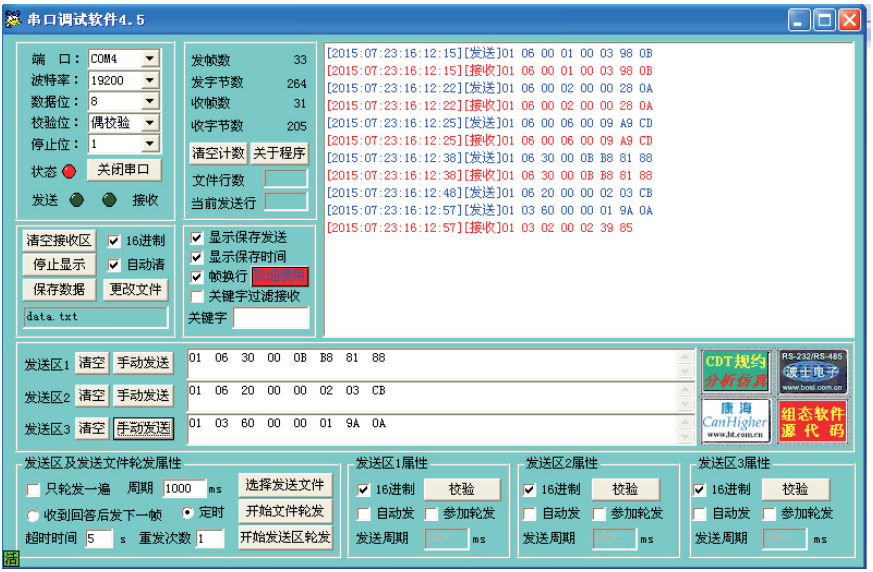
Host send: 01 06 30 00 0B B8 81 88
AC drive response: 01 06 30 00 0B B8 81 88

Finally, star AC drive reverse running and read return to AC drive state.

Host send: 01 06 20 00 00 02 03 CB
AC drive response: 01 06 20 00 00 02 03 CB

Host send: 01 03 60 00 00 01 9A 0A
AC drive response: 01 03 02 00 02 39 85

Below is the testing report of serial interface adujsting, baud rate was set as 19200, digital bit is 8 bits, one even parity, one end bit. Connect AC drive with the COM interface of PC by convert RS232 into Rs485.



Warranty Agreement

① The warranty period of the product is 18 months (refer to the bar code on the equipment body). During the warranty period , if the product fails or damaged under the condition of normal use by following the instruction, we will be responsible for free maintenance.

② Within the warranty period , maintenance will be charged for the damages caused by the following reasons :

✧ The damage caused by improper use or repair/modification without prior permission.

✧ The damage caused by fire , flood , abnormal voltage , other natural disasters and second disaster.

✧ The hardware damage caused by artificial falling or transportation after purchase.

✧ The damage caused by the improper operation.

✧ The damage or failure caused by the trouble out of the equipment (e.g. : External device)

③ If there is any failure or damage to the product, please fill in the information of the Product Warranty Card in details correctly.

④ The maintenance fee is charged according to the newly adjusted Maintenance Price List of our company .

⑤ In general , the warranty card will not be re-issued. Please keep the card and present it to the maintenance personnel when asking for maintenance .

⑥ If there is any problem during the service , please contact the agent of our company or our company directly .

Product Warranty Card

Customer information	**Add. of corporation** :	
	Name of corporation :	**Contact person** :
	P.C. :	**Tel.** :
Product information	**Product model** :	
	Body bar code :	
	Name of agent :	
Failure information	**(maintenance time and content)** : **Maintenance personnel** :	