KAMAN

KM600 Series Inverter

USER MANUAL

Preface

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

The 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. The series is characterized in the high-performance V/F control and Vector control 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.

AC drive Features

Advanced Vector Control Algorithm.

✦ Vector control 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:

✦ Multiple communication modes, 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.

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.

KAMAN

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 a shielded cable for the encoder, and ensure that the shielding layer is reliably grounded.

Use Stage	Safety Grade	Precautions
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.
During Operation	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. ✦ Set and check the parameters again after the AC drive is replaced.

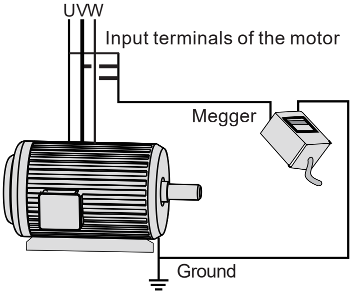
1.3 Cautions

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 500.00Hz. 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

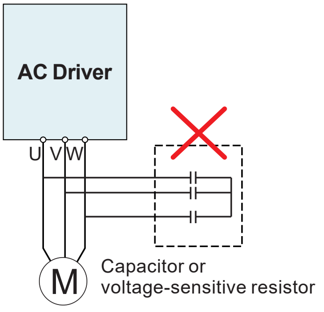
The AC drive may encounter the mechanical resonance point at some output frequencies, which can be avoided by setting the skip frequency. If the operating frequency of the customer coincide with the resonant frequency please modify the operating frequency or change the inherent resonance frequency of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

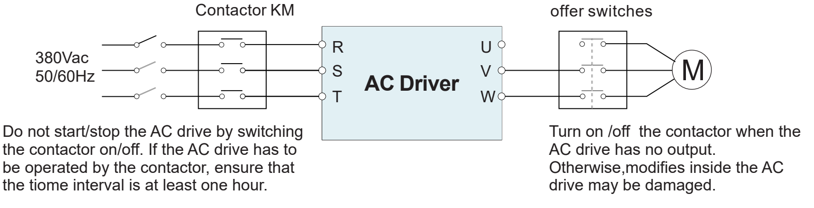
Do not install the capacitor for improving power factor or lightning protection voltagesensitive resistor on the output side of the AC drive because the output of the AC drive is PWM wave. Otherwise, the AC drive may suffer transient overcurrent or even bedamaged.



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.



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°C. Temperature exceeds 40°C , 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°C.

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.

KAMAN

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

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.

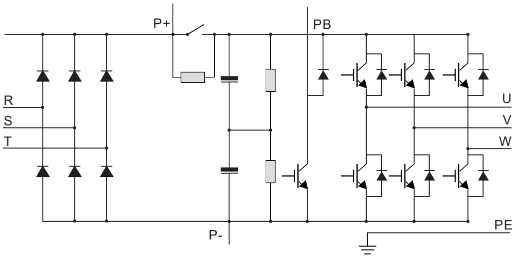


Figure 2-1 0.75kW-18.5kW, 37kW Main Circuit Diagram

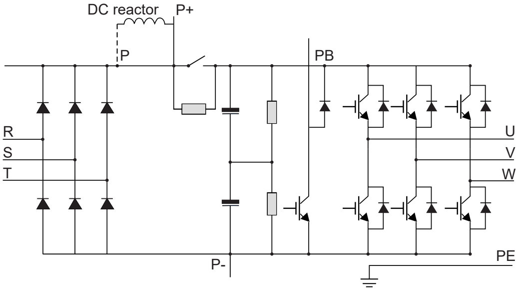


Figure 2-2 22kW,45kW,55kW,75kW Main Circuit Diagram

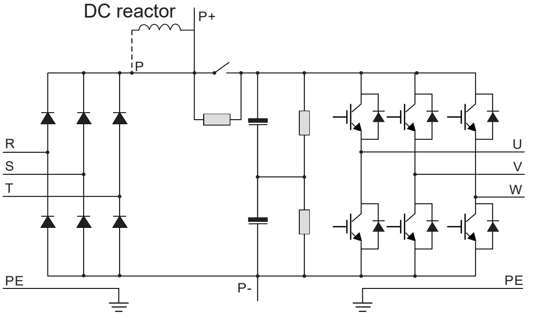


Figure 2-3 90kW~500kW Main Circuit Diagram

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 +.
2. Lower than 75kW AC drive (including) support for external braking resistor, higher than 90kW 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.

KM600 - 4T - 11 G /15 P C

① ② ③ ④ ③ ④ ⑤

Field	Mark	Explanation	Content
Ac drive series	①	Ac drive series	KM600 series
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:With braking unit

Figure 2-4 Name Designation Rules

2.4 Nameplate

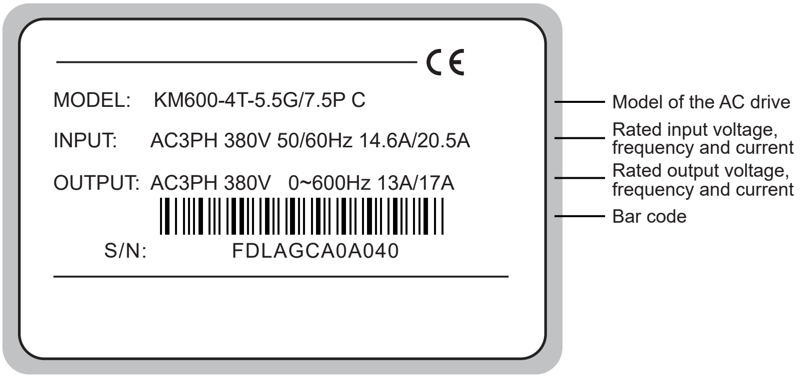


Figure 2-4 Name Designation Rules

2.5 Series of AC drive

Model	Power Capacity (KVA)	Input Current (A)	Output Current (A)	Adaptable Motor (KW)
single-phase 220V Range:-15%~20%				
KM600-2S-0.7GC	1.5	8.2	4.7	0.75
KM600-2S-1.5GC	3.0	14.0	7.5	1.5
KM600-2S-2.2GC	4.0	23.0	10.0	2.2
Three-phase 220V Range:-15%~20%				
KM600-2T-0.7GC	1.5	5.5	4.7	0.75
KM600-2T-1.5GC	3.0	7.7	7.5	1.5
KM600-2T-2.2GC	4.0	12.0	10.0	2.2
Three-phase 380V Range:-15%~20%				
KM600-4T-0.7GC	1.5	3.4	2.3	0.75
KM600-4T-1.5GC	3.0	5.0	3.7	0.75
KM600-4T-2.2GC	4.0	5.8	5.1	1.5
KM600-4T-4.0GC	5.9	10.5	8.5	2.2
KM600-4T-5.5GC	8.9	14.6	13	4.0
KM600-4T-7.5GC	11	20.5	17	5.5
KM600-4T-11GC	17	26.0	25	7.5
KM600-4T-15GC	21	35.0	32	11
KM600-4T-18.5GC	24	38.5	37	15
KM600-4T-22GC	30	46.5	45	18.5
KM600-4T-30GC	40	62.5	60	22
KM600-4T-37G	57	76.0	75	30
KM600-4T-45G	69	92.0	91	37
KM600-4T-55G	85	113	112	45 55
KM600-4T-75G	114	157	150	75
KM600-4T-90G	134	180	176	90
KM600-4T-110G	160	214	210	110
KM600-4T-132G	192	256	253	132
KM600-4T-160G	231	307	304	160
KM600-4T-185G	255	333	330	185
KM600-4T-200G	287	380	377	200
KM600-4T-220G	311	429	426	220
KM600-4T-250G	355	470	465	250
KM600-4T-280G	396	525	520	280
KM600-4T-315G	439	605	600	315
KM600-4T-350G	479	665	660	350
KM600-4T-400G	530	730	725	400
KM600-4T-450G	600	825	820	450
KM600-4T-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	0~500Hz			
	Carrier frequency	0. 5kHz~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:Voltage/Frequency control(V/F) 1:Sensorless vector control (SVC) 2:Feedback vector control (FVC)			
	Startup torque	0.25Hz/150%(SVC)		0Hz/180%(FVC)	
	Speed range	1:200(SVC)		1:1000(FVC)	
	Speed stability accuracy	±0.5%(SVC)		±0.02%(FVC)	
	Torque control accuracy	±5% for 5Hz above(SVC)		±3%(FVC)	
	Overload capacity	150% rated current for 60s			
	Torque boost	Auto torque boost		Manual torque boost: 0.1%~30.0%	
	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 0.0~6500.0s			
	DC braking	DC braking frequency : 0.00Hz to Maximum frequency DC braking time: 0.0 to 1000.0s DC braking current : 0.0 to 100%			
	Jog control	Jog frequency range: 0.00Hz~Maximum frequency			
	Simple PLC Multi-speed	16-speed operating through built-in PLC or control terminal			
	Auto voltage regulation (AVR)	The system maintains a constant output voltage automatically when the grid voltage changes through the permissible range.			
	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.			
	Torque limit and control	The system limits the torque automatically to prevent frequent overcurrent tripping during operation. Torque control is applied in vector control.			

	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	Five 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	One Modbus communication, One CAN communication, One Profibus-DP
	Motor overheating protection	Optional IO expansion card, analog input AI3 acceptable the input of motor temperature sensor .(PT100,PT1000)
	Multiple encoder types	The drive supports a range of different encoder types: Differential encoder, Open-collector encoder, Resolver
Running	Command source	Given the control panel, control terminal, serial communication port given. It can be switched by a variety of ways.
	Frequency source	10 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	10 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 . Two analog input terminals, which supports 0V~10V voltage input or 0 ~ 20mA current input Expansion capability: . Four digital inputs . One analog input terminal, support -10.0~10.0V voltage 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 Expansion capability: One relay output terminal One analog output terminals, support 0~20mA current output or 0~10V voltage output

Item		Specification
Display and operation	LED display	Display each parameter of function code group
	LCD display	Optional accessories.Display each parameter of function code group in Chinese/English/Russian
	Copies of the parameters	It can display the modified parameters, parameter upload, parameter download and other operations through LED and LCD keyboard, so as to facilitate the fast replication of parameters
	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 and Accessories	Protection function	Powered motor short circuit test; Input/output phase failure protection; Over current protection; Over voltage protection; Under voltage protection; Over heat protection ; Overload protection;
	Accessories	Brake unit; Simple IO expansion card, Multi-functional IO expansion card CAN communication extension card Differential input PG card Rotary transformer PG card
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 (2.2kW,for example).

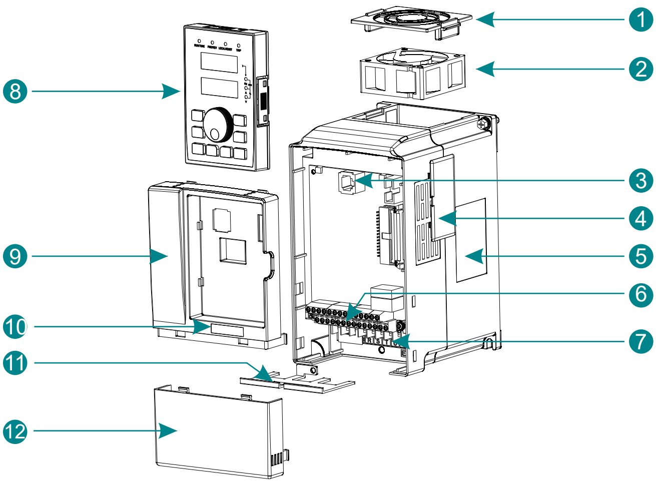
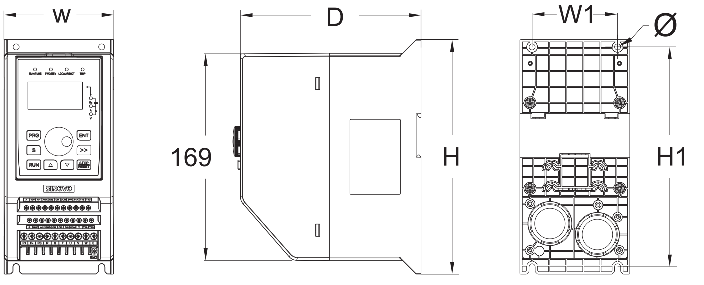


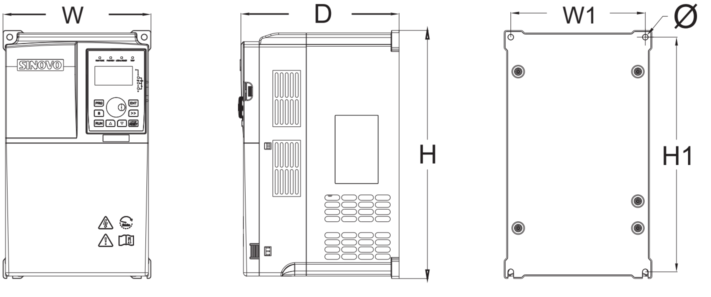
Figure 2-6 Product structure diagram

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	Series Label	Refer to 2.3 "Naming Rules".
11	Apron	Convenient input and output wiring.
12	Lower-cover	Protect the internal components.

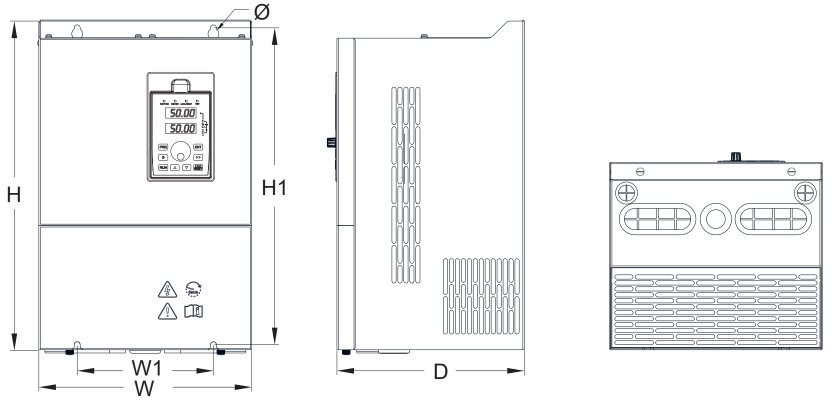
2.7.2 Product Outline, Installation Hole Size



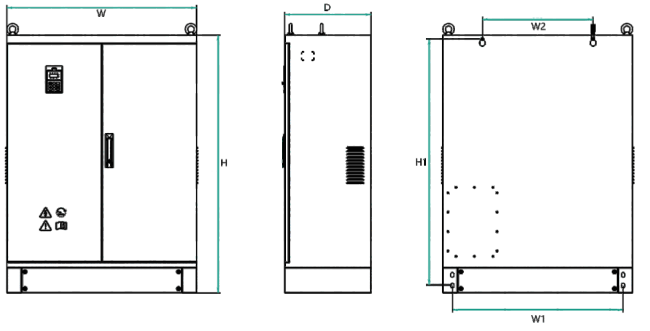
Model	Inverter			Installation			GW(kg)
	H (mm)	W (mm)	D (mm)	H1 (mm)	W1 (mm)	Diameter (mm)	
KM600-4T-0.7GC	192	90	148	180	70	Ø5	1.5
KM600-4T-1.5GC							
KM600-4T-2.2GC							
KM600-4T-4.0GC							



Model	Inverter			Installation			GW(kg)
	H (mm)	W (mm)	D (mm)	H1 (mm)	W1 (mm)	Diameter (mm)	
KM600-4T-5.5GC	190	110	150	179	98	Ø5	2.5
KM600-4T-7.5GC	210	130	160	198	118	Ø5	3.5
KM600-4T-11GC	250	155	176	236	141	Ø5	4.0
KM600-4T-15GC	295	176	188	279	160	Ø7	6.0
KM600-4T-18.5GC							
KM600-4T-22GC	337	245	188	320	228	Ø7	9.0
KM600-4T-30GC							



<table>
<tr><th rowspan="2">Model</th><th colspan="3">Inverter</th><th colspan="3">Installation</th><th rowspan="2">GW(kg)</th></tr>
<tr><th>H (mm)</th><th>W (mm)</th><th>D (mm)</th><th>H1 (mm)</th><th>W1 (mm)</th><th>Diameter (mm)</th></tr>
<tr><td>KM600-4T-37G</td><td>387</td><td>250</td><td>220</td><td>372</td><td>150</td><td rowspan="3">Ø7</td><td rowspan="2">13</td></tr>
<tr><td>KM600-4T-45G</td><td rowspan="2">440</td><td rowspan="2">270</td><td rowspan="2">256</td><td rowspan="2">426</td><td rowspan="2">180</td></tr>
<tr><td>KM600-4T-55G</td><td>20</td></tr>
<tr><td>KM600-4T-75G</td><td>469</td><td>307</td><td>263</td><td>450</td><td>200</td><td rowspan="3">Ø10</td><td>26</td></tr>
<tr><td>KM600-4T-90G</td><td rowspan="2">590</td><td rowspan="2">340</td><td rowspan="2">305</td><td rowspan="2">565</td><td rowspan="2">200</td><td rowspan="2">47</td></tr>
<tr><td>KM600-4T-110G</td></tr>
<tr><td>KM600-4T-132G</td><td rowspan="3">740</td><td rowspan="3">450</td><td rowspan="3">329</td><td rowspan="3">715</td><td rowspan="3">360</td><td rowspan="6">Ø12</td><td rowspan="3">99</td></tr>
<tr><td>KM600-4T-160G</td></tr>
<tr><td>KM600-4T-185G</td></tr>
<tr><td>KM600-4T-200G</td><td rowspan="3">940</td><td rowspan="3">500</td><td rowspan="3">369</td><td rowspan="3">914</td><td rowspan="3">400</td><td rowspan="3">167</td></tr>
<tr><td>KM600-4T-220G</td></tr>
<tr><td>KM600-4T-250G</td></tr>
<tr><td>KM600-4T-280G</td><td rowspan="3">1045</td><td rowspan="3">725</td><td rowspan="3">390</td><td rowspan="3">1012</td><td rowspan="3">600</td><td rowspan="3">Ø14</td><td rowspan="3">206</td></tr>
<tr><td>KM600-4T-315G</td></tr>
<tr><td>KM600-4T-350G</td></tr>
</table>



Model	Inverter			Installation			GW(kg)
	H (mm)	W (mm)	D (mm)	H1 (mm)	W1 (mm)	Diameter (mm)	
KM600-4T-400G	1220	900	410	1162	525	Ø14	211
KM600-4T-450G							
KM600-4T-500G							

2.7.3 External Keypad Installation Dimensions

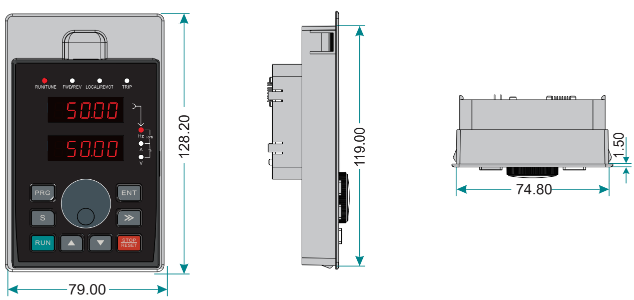


Figure 2-3 Keypad Installation dimensions

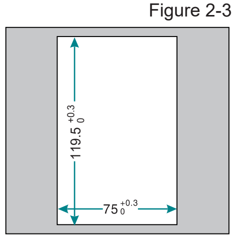


Figure 2-4
Opening dimension diagram
for keypad with base

2.8 Peripheral Electrical Components System Structure

When using the 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, AC drive is equipped with a variety of optional accessories and expansion card to achieve various functions. More than 90kW series three-phase 380V system structure as shown in the figure below(The figure AC drive terminal refer to 90~110kW):

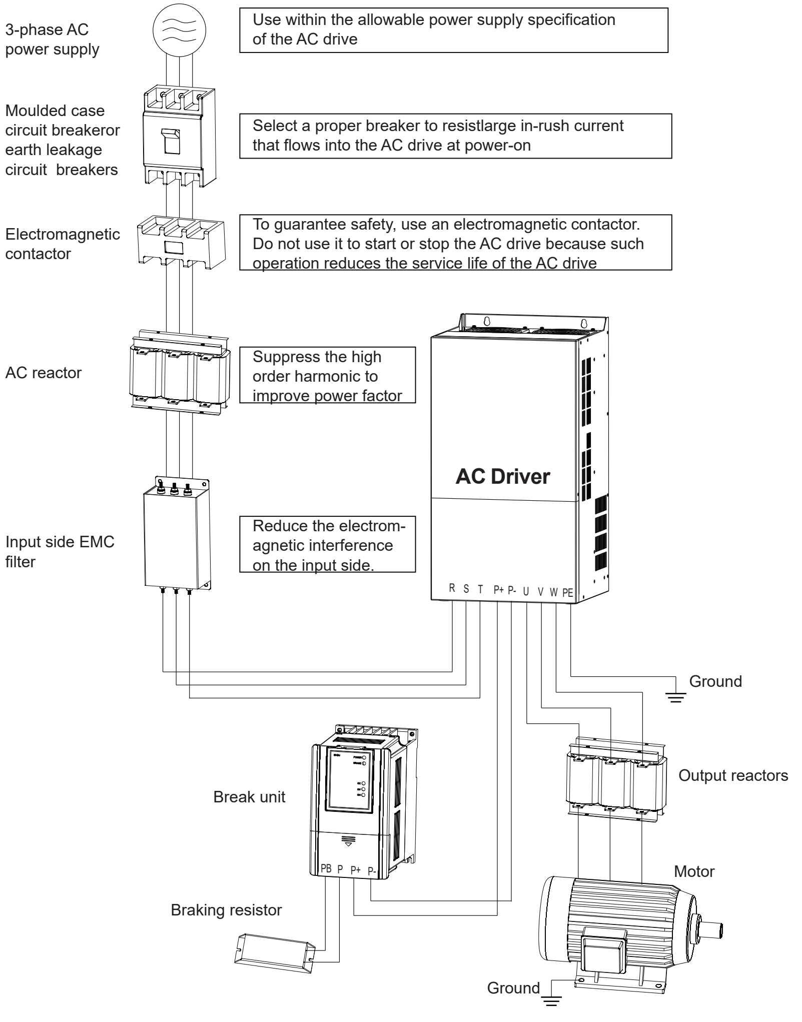


Figure 2-15 Under 37 kW series 3-phase 380 V system structure diagram

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	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
Two phase 220V					
KM600-2S-0.7GC	16	10	2.5	2.5	1.0
KM600-2S-1.5GC	20	16	4.0	2.5	1.0
KM600-2S-2.2GC	32	20	6.0	4.0	1.0
Three phase 220V					
KM600-2T-0.7GC	16	10	2.5	2.5	1.0
KM600-2T-1.5GC	25	16	4.0	2.5	1.0
KM600-2T-2.2GC	25	16	4.0	4.0	1.0
Three phase 380V					
KM600-4T-0.7GC	10	6	2.5	2.5	1.0
KM600-4T-1.5GC	16	10	2.5	2.5	1.0
KM600-4T-2.2GC	16	10	2.5	2.5	1.0
KM600-4T-4.0GC	25	16	4.0	4.0	1.0
KM600-4T-5.5GC	32	25	4.0	4.0	1.0
KM600-4T-7.5GC	40	30	4.0	6.0	1.0
KM600-4T-11GC	63	40	4.0	6.0	1.0
KM600-4T-15GC	63	40	6.0	10	1.0
KM600-4T-18.5GC	100	63	6	10	1.5
KM600-4T-22GC	100	63	10	10	1.5
KM600-4T-30GC	125	100	16	16	1.5
KM600-4T-37G	160	100	16	25	1.5
KM600-4T-45G	200	125	25	25	1.5
KM600-4T-55G	250	160	50	35	1.5
KM600-4T-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
KM600-4T-90G	250	160	70	50	1.5
KM600-4T-110G	350	350	120	120	1.5
KM600-4T-132G	400	400	150	150	1.5
KM600-4T-160G	500	400	185	185	1.5
KM600-4T-185G	600	400	185	185	1.5
KM600-4T-200G	600	600	150*2	150*2	1.5
KM600-4T-220G	600	600	150*2	150*2	1.5
KM600-4T-250G	800	600	185*2	185*2	1.5
KM600-4T-280G	800	800	185*2	185*2	1.5
KM600-4T-315G	1000	800	150*3	150*3	1.5
KM600-4T-350G	1000	800	150*4	150*4	1.5
KM600-4T-400G	1200	1000	150*4	150*4	1.5
KM600-4T-450G	1200	1000	150*4	150*4	1.5
KM600-4T-500G	1600	1000	150*4	150*4	1.5

2.9 Option 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,DB9 interface	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 AC380V system 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.

380V voltage class brake resistance selection table

AC drive Capacity (kw)	Braking Unit		Braking Resistor (D=10%)		
	Specification	Quantity	Resistance	Power	Quantity
0.7	Built-in as standard	1	750Ω	150W	1
1.5		1	400Ω	300W	1
2.2		1	250Ω	400W	1
4.0		1	150Ω	500W	1
5.5		1	100Ω	800W	1
7.5		1	75Ω	1000W	1
11		1	50Ω	1200W	1
15		1	40Ω	2000W	1
18.5		1	32Ω	3000W	1
22		1	27Ω	4000W	1
30		1	22Ω	5000W	1
37	Built-in Optional	1	20Ω	6000W	1
45		1	16Ω	7000W	1
55		1	13Ω	10000W	1
75		1	10Ω	14000W	1
90	External braking unit	1	6.8Ω	16000W	1
110		1	6.5Ω	22000W	1
132		1	6.2Ω	24000W	1
160		1	5.4Ω	30000W	1
185		1	4.7Ω	32000W	1
200		2	4.5Ω	17000W	2
220		2	4.1Ω	20000W	2
250		2	3.6Ω	23000W	2
280		2	3.2Ω	27000W	2
315		3	4.3Ω	20000W	3
355		3	3.8Ω	23000W	3
400		3	3.4Ω	25000W	3
450		3	3.0Ω	26000W	3
500		3	2.8Ω	30000W	3

220V voltage class

AC drive Capacity (kw)	Braking Unit		Braking Resistor (D=10%)		
	Specification	Quantity	Resistance	Power	Quantity
0.7	Built-in as standard	1	200Ω	120W	1
1.5		1	100Ω	300W	1
2.2		1	75Ω	500W	1
4.0		1	33Ω	800W	1
5.5		1	22Ω	1300W	1
7.5		1	16Ω	1700W	1
11		1	12Ω	2300W	1
15		1	9Ω	3000W	1

18.5	Built-in Optional	1	16Ω	3900W	1
22		1	12Ω	4600W	1
30		1	9Ω	5500W	1
37		1	7Ω	6800W	1
45	External braking unit	2	6Ω	5000W	2
55		2	5Ω	6000W	2

2.10 Connection Methods

2.10.1 Braking Resistor Connection

Under 30kW(30kW included) AC drive braking resistor connection as shown in figure 2-16.

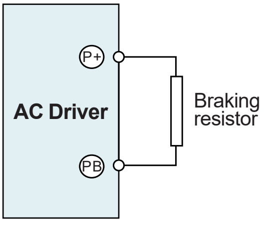


Figure 2-16 braking resistor connection

2.10.2 Braking Unit Connection

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

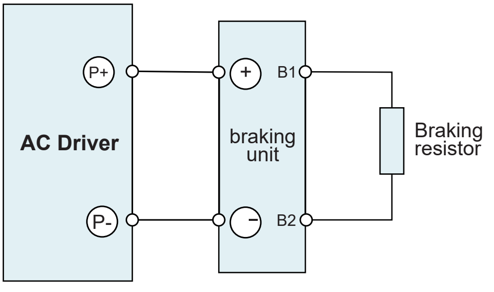


Figure 2-17 braking unit connection

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.

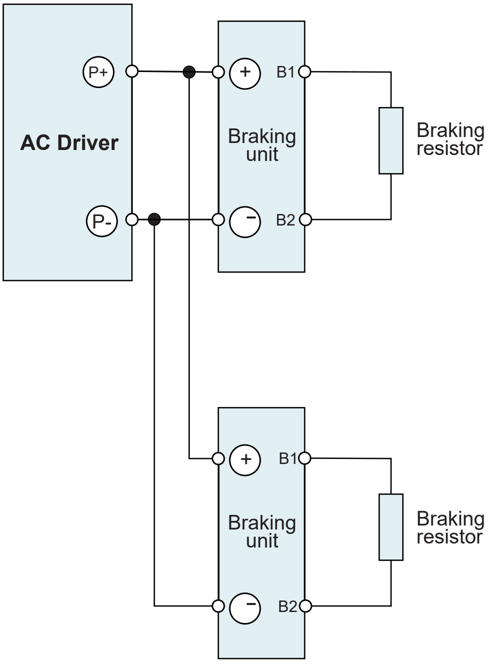


Figure 2-18 Braking ones in parallel connection

KAMAN

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//s^2(0.6g)
Installation direction	AC drive should be installed on an upright position to ensure sufficient cooling effect.

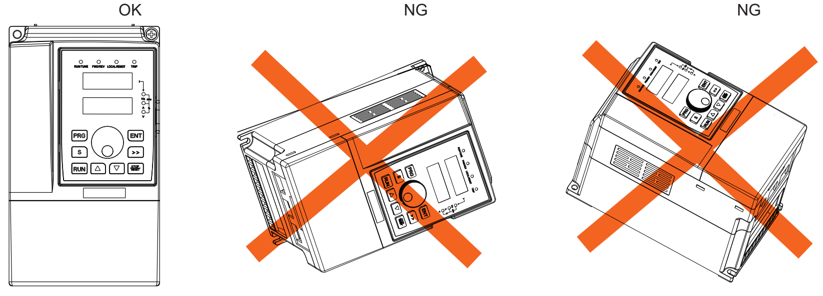
Note:

1. 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)

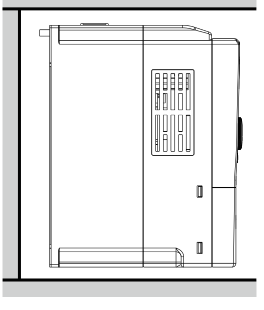


Figure3-2 Installation manner

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

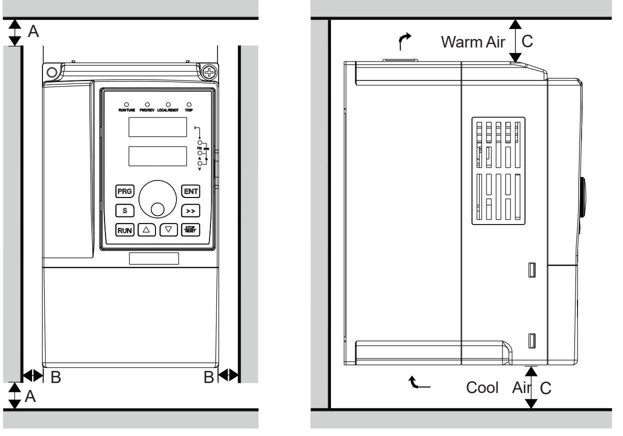


Figure 3-3 Single installation

Note:

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

3.2.5 Multiple Installation

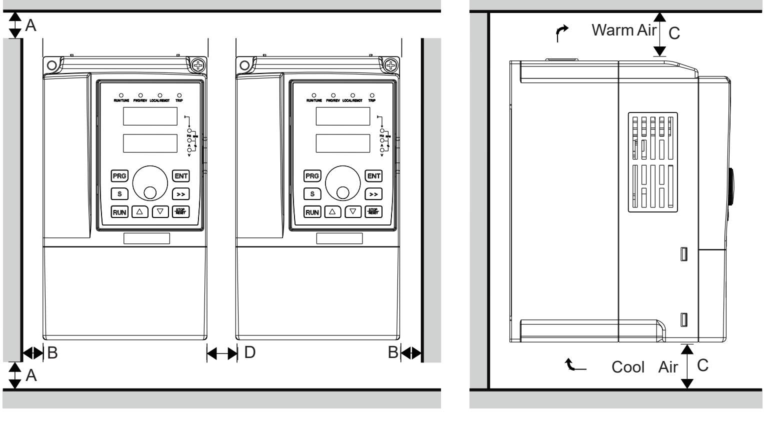


Figure 3-4 Parallel installation

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

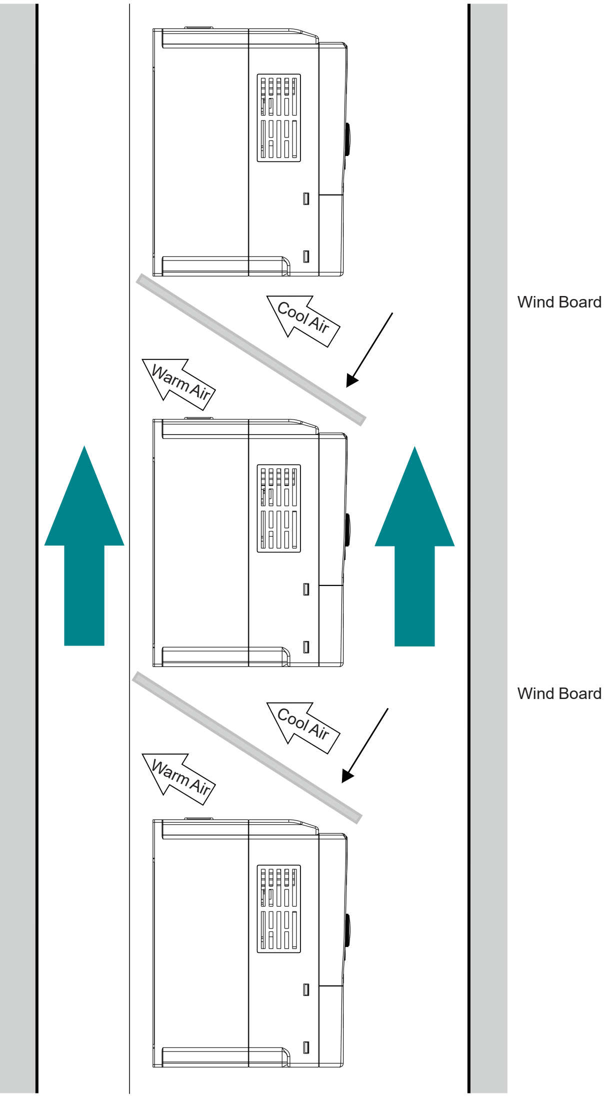


Figure 3-5 Vertical installation

Note:

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

3.2.7 Canted Installation

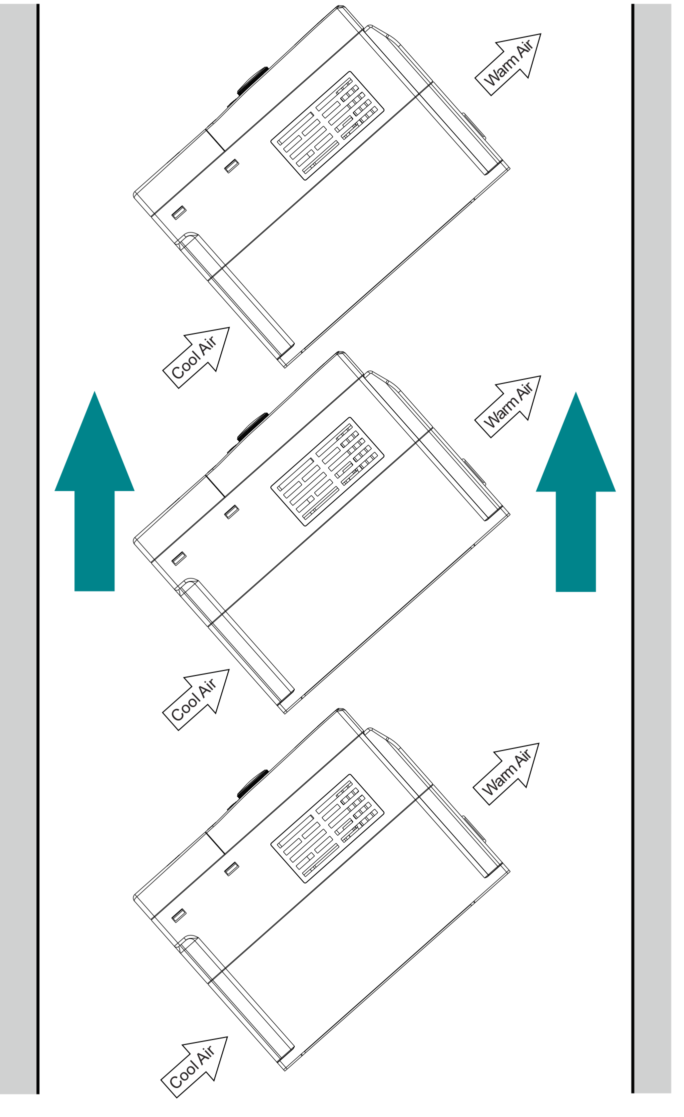


Figure 3-6 Tilt installation

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

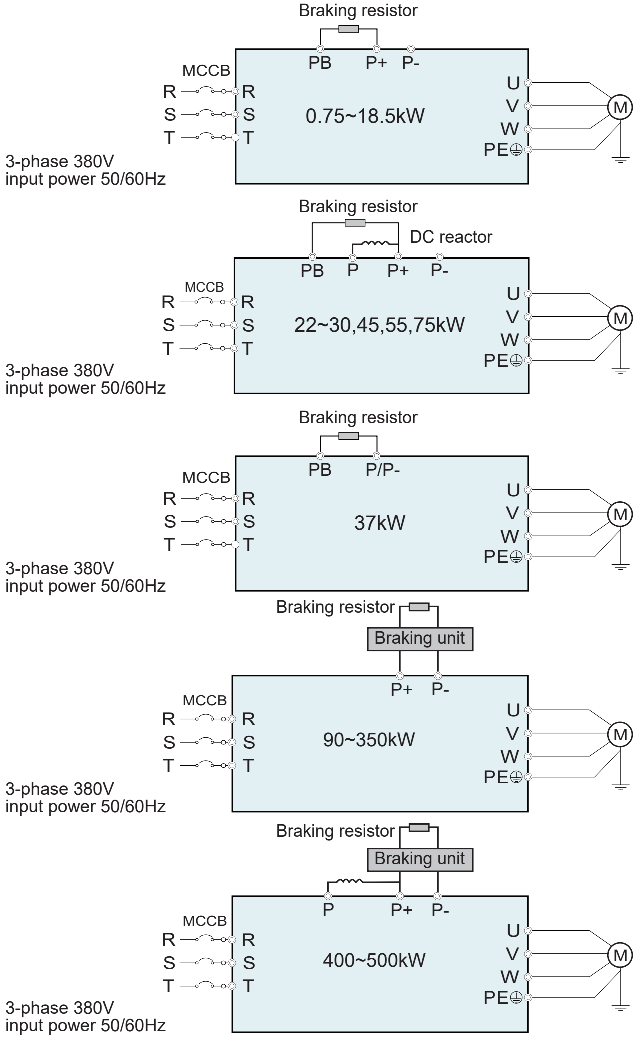
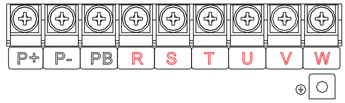


Figure 2-6 Main circuit wiring diagram

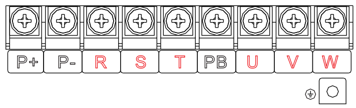
Note:

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. 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;
4. 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;

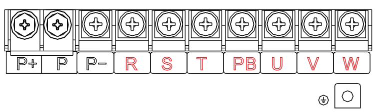
3.3.2 Main Circuit Terminals Diagram



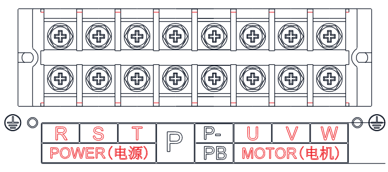
0.7~11kW Diagram of the main loop terminal



15~18kW Diagram of the main loop terminal

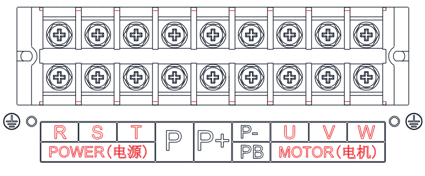


22~30kW Diagram of the main loop terminal



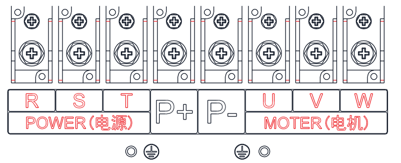
37kW Diagram of the main loop terminal

G type has P- no PB GC type has no P- has PB

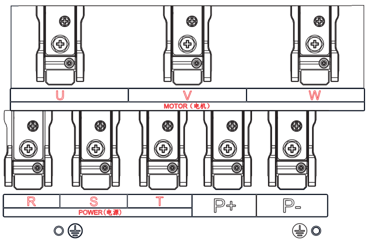


45~75kW Diagram of the main loop terminal

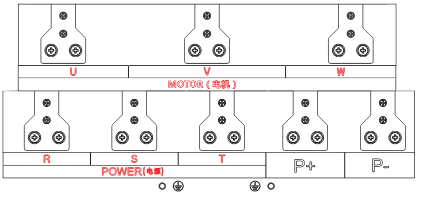
G type has P- no PB GC type has no P- has PB



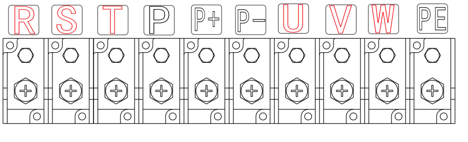
90~110kW Diagram of the main loop terminal



132~250kW Diagram of the main loop terminal



280~350kW Diagram of the main loop terminal



400~500kW Diagram of the main loop 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.

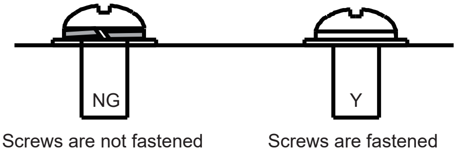


Figure 3-15 Screw installation diagram

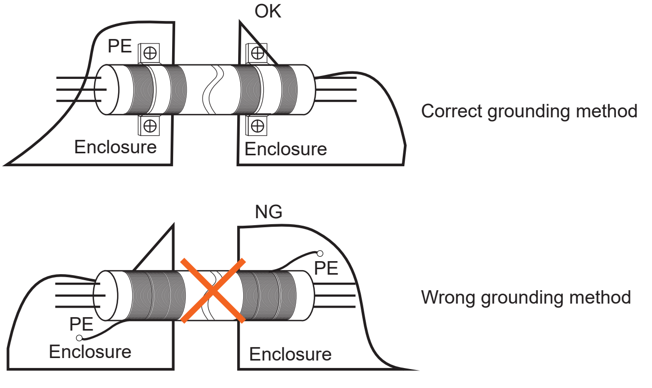


Figure 3-16 360-degree grounding technique diagram

Terminal	Terminal Name				Function Description
	0.75~18.5kW	22~75kW	75~350kW	400~500kW	
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	—	YES	—	YES	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+	YES	YES	YES	YES	
PB	YES	YES	—	—	
P-	YES	YES	YES	YES	
PE	400V:Grounding resistance is less than 10Ω				Protective grounding terminals, every machine is provided PE terminals as the standard configuration.These terminals should be grounded with proper techniques.

Note:

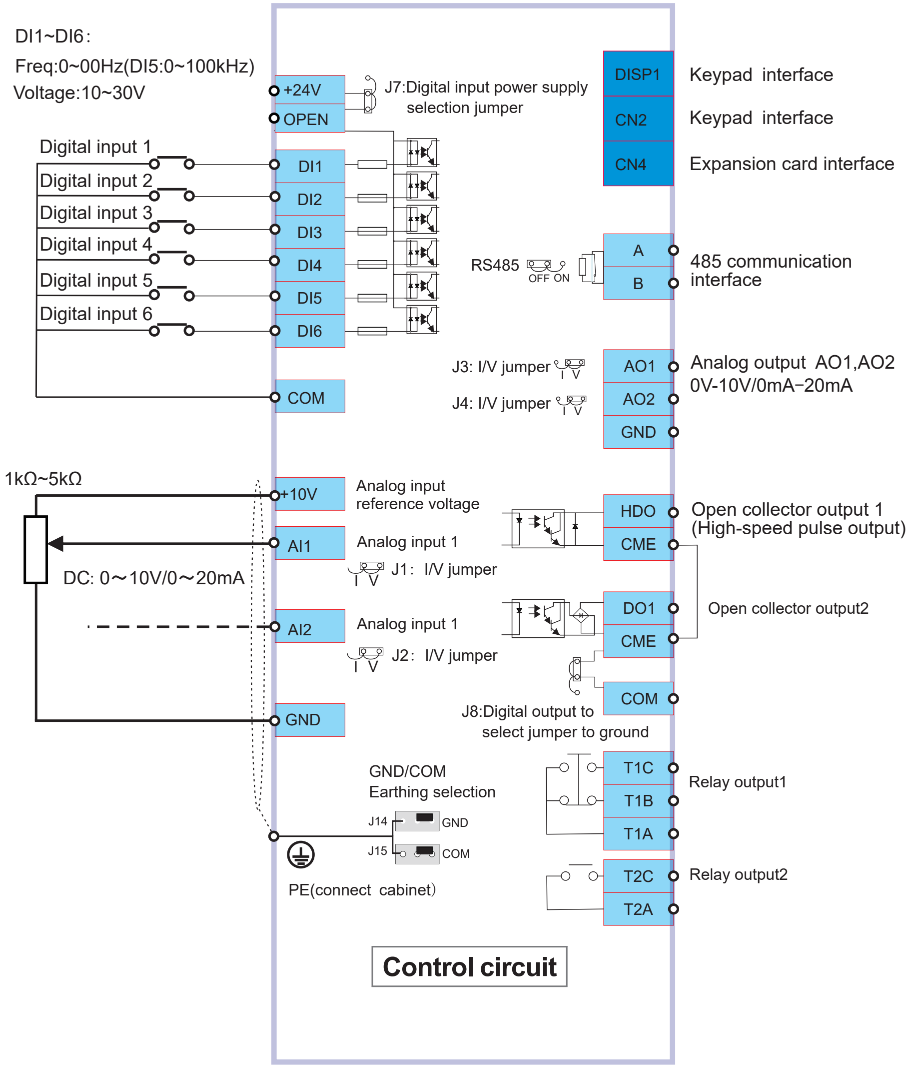
1. Do not use an asymmetrically constructed motor cable. If there is a sysmmetically constructed grounding conductor in the motor cable in addition to the conductive shield,connect the grounding conductor to the grounding terminal at the AC drive and motor ends;

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.

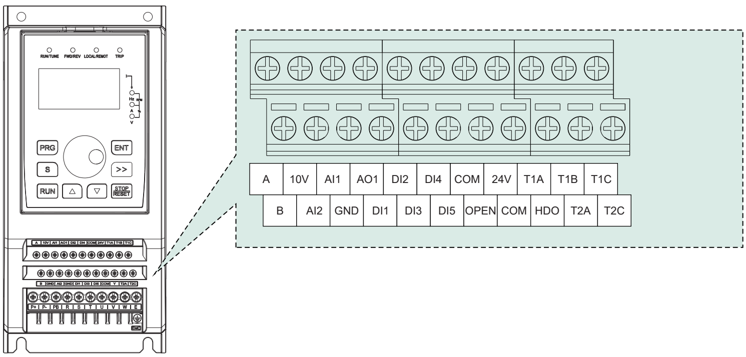
3.3.4 Control Circuit Wiring Diagram



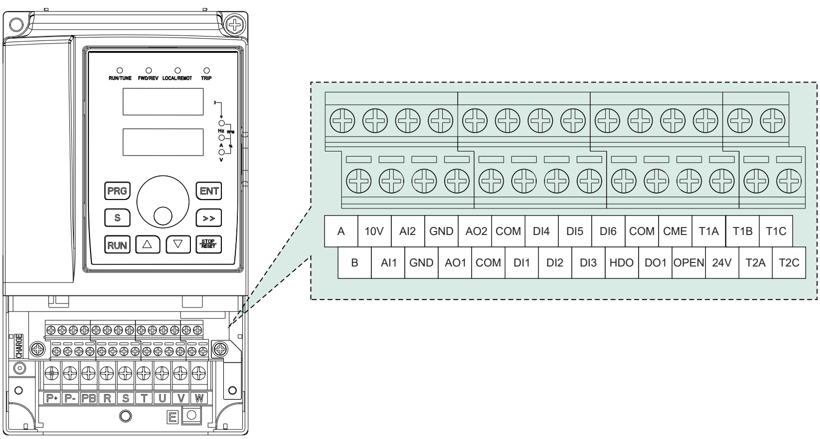
Description:

The control panel for the power segment below 5.5kW lacks DI6, AO2, DO1 and CME compared to the above figure.

3.3.5 Control Panel Terminals



0.75~4.0kW Control terminal diagram



5.5~500kW Control terminal diagram

Control Panel Terminal Function Instructions(continued)

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	
Analog 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 or J4 on the control board and factory defaulted as voltage input.
	AO2	Analog output 2	
	GND	Analog ground	Internal isolated with COM
	+24V	+24V	24V±10%: Internal isolated with GND
Digital input	OPEN	Digital input terminal common	It is used for switching between high and low level of input. By default, OPEN is short-connected with +24V through jumper J7, that is, the switch input is low effective. If the enable level needs to be modified, the connection position of the jumper needs to be changed
	COM	+24V	Internal isolated with GND
	DI1~DI5	Digital input 1-5	Input specification: 24VDC/5mA Frequency range: 0~200Hz Voltage range: 10V~30V NOTE: DI5 supports 0~100kHz high speed pulse input
Digital output	DO1	Open collector output	Voltage range: 0~24V Current range: 0~50mA
	HDO	High-speed pulse output	Pulse output: 0~50kHz
	CME	DO1/HDO1 Digital output public ground	0~20mA: Input impedance: 500Ω, Max input current: 25mA
			When leaving the factory, CME and COM have been short -connected through jumper J8 (DO1 defaults to +24V driver). When DO1 wants to be driven by an external power source, CME and COM must be disconnected.
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 +	Baud rate 1200/2400/4800/9600/19200/38400 Use twisted pair or shielded cable, the longest distance:300m Internal isolated with COM
	B	485 differential signal -	
	GND	Analog ground	

Switching Dial Code Switch Function Description

Name	Jumpers Figure	Function	Factory setting
485	ON OFF	RS485 communication terminating resistor selection ON: 120Ω termination resistor connection is valid OFF: Without termination resistor connection	OFF
AI1	I V	I is the current input: 0~20mA. V is voltage input: 0~10V.	0~10V
AI2	I V	I is the current input: 0~20mA. V is voltage input: 0~10V.	0~10V
AO1	I V	I is current output: 0~20mA. V is voltage output: 0~10V.	0~10V
AO2	I V	I is current output: 0~20mA. V is voltage output: 0~10V.	0~10V
J7	NULL OPEN	OPEN:OPEN is connected with 24V (DI low level valid) NULL: OPEN is disconnected from 24V (user selects according to demand)	OPEN
J8	NULL CME	CME: CME is connected with COM (DO1 defaults to 24V drivers) NULL: CME is disconnected from COM (Use external power to drive).	CME
J14,J15	J6 J5 COM GND	Choose whether connect PE with GND/COM. Occcasions with interference, Connect PE with GND/COM can improve the ablility to resist the interference.	Connection (Jumper is UP)

Note:

The jumper wire of 0.75~ 4.0kW control board shall be arranged horizontally.

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.

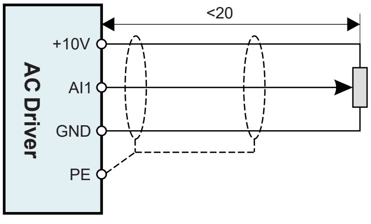


Fig3-19 Analog input and output terminal wiring diagram

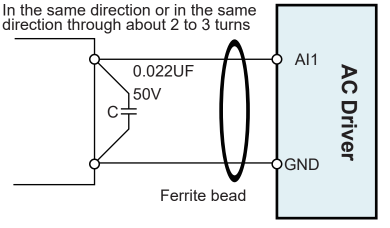


Figure 3-20 Analog input terminal process wiring diagram

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.

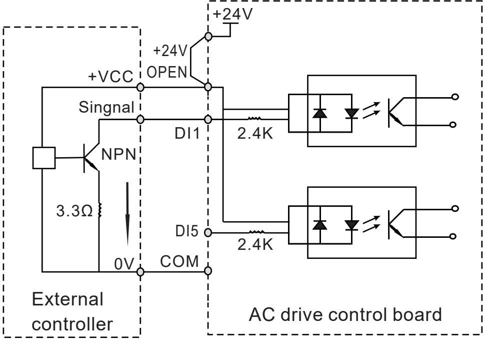


Figure 3-21 Sink wiring

This is the most commonly used wiring mode. To apply external power supply, remove jumpers between 24V 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.

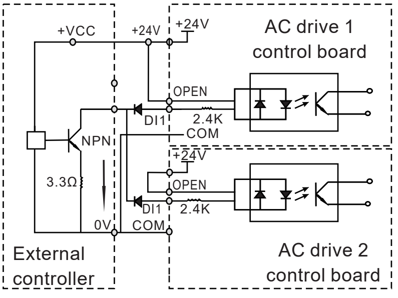


Figure 3-22 DI terminals connected in parallel in SINK mode

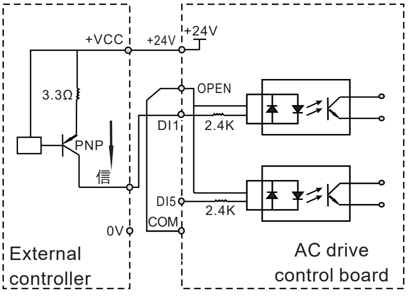


Figure 3-23 Source Wiring

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.

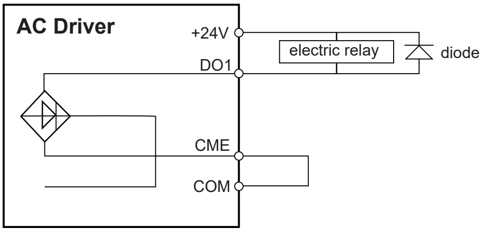


Figure 3-24 DO Terminal Wiring diagram

⚠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 connect by J8(DO1 is the default 24V drive). When the DO driven by external power, remove the jumper between CME and COM(Jumper J8).

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.

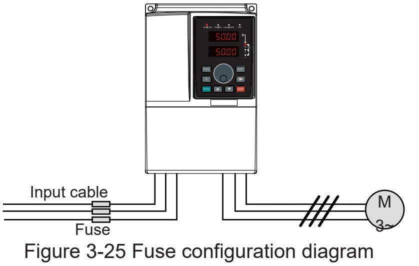


Figure 3-25 Fuse configuration diagram

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 the AC drive, read the state data and adjust parameters.

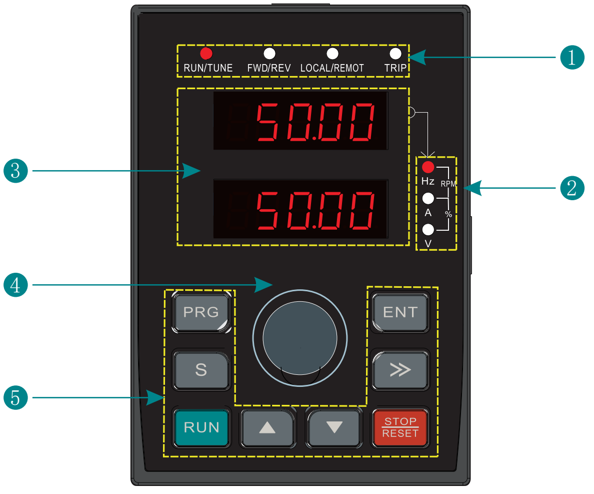
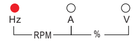
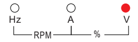
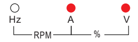


Figure 4-1 Keypad diagram

Note:
Optional LCD keyboard.

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 rowspan="6">2</td><td rowspan="6">Unit indicator</td><td colspan="3">It represents the current display of the Keypad</td></tr>
<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>
<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>Correspo-nding letter</th><th>Display letter</th><th>Correspo-nding letter</th><th>Display letter</th><th>Correspo-nding 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 potent-iometer</td><td colspan="3">When the frequency source X or Y 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 rowspan="5">5</td><td rowspan="5">Keypad button zone</td><td>PRG</td><td>Program key</td><td>Enter or escape from the first level menu and remove the parameter quickly</td></tr>
<tr><td>ENT</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 para-meter modification</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	Corresponding to F10.00

4.3 Display of Keypad

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

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 F10.04.See the instructions of F10.04 for the detailed definition of each bit.

In the stopping state, there are 16 stopping parameters can be selected to be displayed or not. Add the decimal value of the parameter to display and enter F10.04, press > > button can shift the parameters from left to right.

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 25 parameters can selected to be displayed or not. Add the decimal value of the parameters to display and enter F10.01 and F10.02, press > > button can shift the parameters from left to right.

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 F00.08).The editing state is displayed on two classes of menu, and the order is: function code group/function code number ＞ function code parameter, press "ENT" into the displayed state of function parameter. On this state, you can press "ENT" to save the parameters or press "PRG " to retreat.

4.4 Keypad Operation

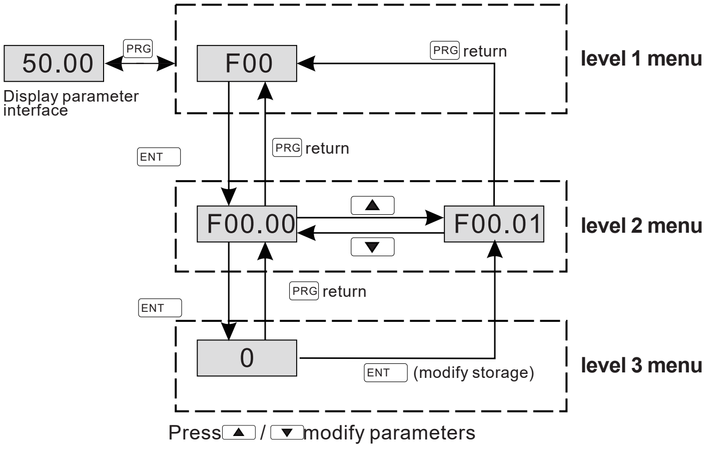
Operate the AC drive via operations panel. See the detailed structure description of function code in the brief diagram of function codes.

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 "ENT" key to return to level2 menu from the level 3 menu. The difference is: pressing "ENT" 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 to stop.

Example: Set function code F03.08 from 20.00s to 10.00s.

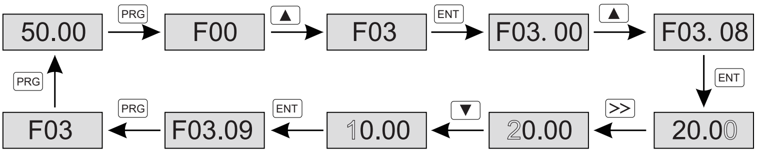


Figure 4-3 Modifying parameters diagram

4.4.2 Password Setting

The AC drive provide password protection function to users. Set F00.08 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 F00.08 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.

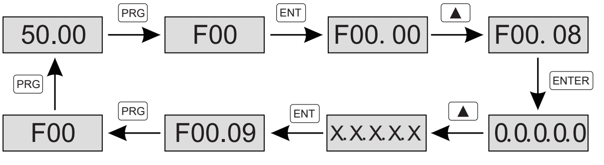


Figure 4-4 Password setting diagram

4.4.3 How to watch the AC drive state through function codes

The AC drive provide group F99 as the sate inspection group. Users can enter into F99 directly to watch the state. Operations procedure as follows:

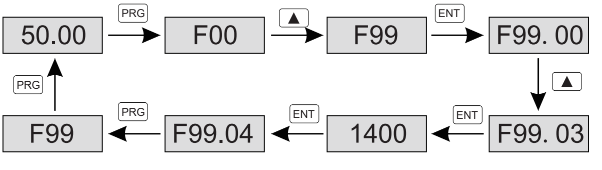


Figure 4-5 Motor speed diagram

Chapter 5

Function Parameter Table

5.1 Chapter of This Content

This chapter lists and describes the function parameters.

5.2 Function Parameters Table

The function parameters of the AC drive have been divided according to the function. Each function group contains certain function codes applying 3-level menus. For example, "F08.08" means the eighth function code in the F8 group function.

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;

"X": 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.

The sixth line "Address": The address of the function parameter in the communication.

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 F00.08 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 F00.08 is set to 0,the password can be canceled. If F00.08 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	Modifi-cation	Add.
Group F00 System Function Group					
F00.00	Motor selection	0: Motor 1 1: Motor 2	0	X	0x000
F00.01	Motor control technique	Ones: motor 1control parameter 0: V/F control 1: SVC control 1: FVC control Tens: motor 2 control parameter 0: V/F control 1: SVC control 1: FVC control	0	X	0x001
F00.02	Type of drive	0: Type G (applicable to constant-torque load) 1: Type P (applicable to light-duty load)	0	X	0x002
F00.03	LCD display language	0:Chinese 1:English 2:Russian	0	○	0x003
F00.04	RESERVED			*	
F00.05	Parameters copy	0: No operation 1: Displays the modified parameters 2: Parameters copied to control panel 3: Parameters copied(excluding motor parameters)to control board 4: Parameters copied(including motor parameters)to control board	0	○	0x005
F00.06	Parameters protection	0: All parameter programming allowed 1: Only this parameter programming allowed	0	○	0x006
F00.07	Software version	XXXXX		*	0x007
F00.08	User's password	0: No password Other: Password protection	0	○	0x008
F00.09	Supplier's password	XXXXX	Model de-pendent	○	0x009
F00.10	Parameter restoration	0: No operation 1: Restore all parameters to factory default (excluding motor parameters) 2: Clear fault record 3: Restore all parameters to factory default (including motor parameters)	0	X	0x00A

<table>
<tr><th>Function code</th><th>Name</th><th>Setup range</th><th>Default Value</th><th>Modification</th><th>Add.</th></tr>
<tr><td colspan="6">Group F01 Basic Function Group</td></tr>
<tr><td>F01.00</td><td>X frequency command</td><td rowspan="2">0: Keypad digital setting
1: Keypad potentiometer setting
2: Analog AI1 setting
3: Analog AI2 setting
4: Analog AI3 setting
5: High-speed pulse DI5 setting
6: Multi-step Freq running setting
7: Simple PLC setting
8: PID control setting
9: Communication setting</td><td>1</td><td>X</td><td>0x100</td></tr>
<tr><td>F01.01</td><td>Y frequency command</td><td>3</td><td>X</td><td>0x101</td></tr>
<tr><td>F01.02</td><td>Y frequency command reference</td><td>0: MAX. output frequency(F01.07)
1: X frequency command</td><td>0</td><td>○</td><td>0x102</td></tr>
<tr><td>F01.03</td><td>Y frequency range</td><td>0.0~100.0%</td><td>100.0%</td><td>○</td><td>0x103</td></tr>
<tr><td>F01.04</td><td>Combination of the setting codes</td><td>Ones:
Frequency reference selection
0: X
1: X and Y calculation
(based on tens position)
2: Switchover between X and Y
3: Switchover between X and "X&Y calculation"
4: Switchover between Y and "X&Y calculation"

Tens:
X and Y calculation formula
0: X + Y
1: X - Y
2: Max. (X, Y)
3: Min. (X, Y)</td><td>00</td><td>○</td><td>0x104</td></tr>
<tr><td>F01.05</td><td>Keypad digital setting frequency</td><td>0.00Hz~F01.07(Max. Freq)</td><td>50.00Hz</td><td>○</td><td>0x105</td></tr>
<tr><td>F01.06</td><td>Retentive of digital setting frequency</td><td>Ones:
Retentive selection of digital setting frequency upon stop
0: Not retentive
1: Retentive

Tens:
Retentive selection of digital setting frequency upon power-off
0: Not retentive
1: Retentive</td><td>11</td><td>○</td><td>0x106</td></tr>
</table>

Function code	Name	Setup range	Default Value	Modification	Add.
F01.07	Max. output frequency	50.00Hz~500.00Hz	50.00Hz	×	0x107
F01.08	Upper limit frequency source selection	0: F01.09 1: AI1 2: AI2 3: AI3 4: Pluse	0	○	0x108
F01.09	Upper limit frequency	F01.10~F01.07(Max. frequency)	50.00Hz	○	0x109
F01.10	Lower limit frequency	0.00Hz~F01.09 (Upper limit frequency)	0.00Hz	○	0x10A
F01.11	Jog frequency	0.00Hz~F01.07(Max. frequency)	5.00Hz	○	0x10B
F01.12	Jog selection in running state	0:allowed 1:prohibited	0	○	0x10C
F01.13	Action if running frequency<lower limit frequency	0: Operating frequency lower limit 1: Zero speed operation 2: Stop	0	○	0x10D
F01.14	Time-delay of stop when running frequency<lower limit frequency	0.0s~6500.0s	0.0s	○	0x10E
F01.15	Jump frequency 1	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x10F
F01.16	Jump frequency 1 width	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x110
F01.17	Jump frequency 2	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x111
F01.18	Jump frequency 2 width	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x112

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F02 Startup and stop Control					
F02.00	Run command channel	0: Keypad run command channel 1: Terminal command channel (Keypad STOP disabled) 2: Terminal command channel (Keypad STOP enable) 3:Communication command (Keypad STOP disabled) 4:Communication command (Keypad STOP enabled)	0	○	0x200
F02.01	Binding command source to frequency source	Ones: Binding keyboard command to frequency source 0: No function 1: Keypad digital setting 2: Keypad potentiometer setting 3: Analog AI1 setting 4: Analog AI2 setting 5: Analog AI3 setting 6: High-speed pulse DI5 setting 7: Multi-speed running setting 8: Simple PLC program setting 9: PID control setting A: Communication setting Tens: Binding terminal command to frequency source 0–9, same as Ones Hundreds: Binding communication command to frequency source 0–9, same as Ones	000	○	0x201
F02-02	Rotation direction	0: Same direction 1: Reverse direction	0	○	0x202
F02.03	Start-up mode	0: Start-up directly 1: Start-up after Speed tracking 2: Start-up after DC braking/Pre excitation	0	○	0x203
F02.04	Starting frequency of direct start	0.00~10.00Hz	0.00Hz	×	0x204
F02.05	Retention time of the starting frequency	0.0~100.0s	0.0s	×	0x205

Function code	Name	Setup range	Default Value	Modification	Add.
F02.06	DC injection braking level/ Pre excitation level	0.0~100.0%	50.0%	×	0x206
F02.07	DC injection braking active time/ Pre-excitation active time	0.0~1000.0s	0.0s	×	0x207
F02.08	RESERVED			*	—
F02.09	Stop Mode	0: Decelerate to stop 1: Coast to stop	0	○	0x209
F02.10	Starting frequency of DC braking	0.00~F01.07(Max. frequency)	0.00Hz	○	0x20A
F02.11	Waiting time of DC braking	0.0~1000.0s	0.0s	○	0x20B
F02.12	Stopping DC braking current	0.0~100.0%	50.0%	○	0x20C
F02.13	Stopping DC braking time	0.0~1000.0s	0.0s	○	0x20D
F02.14	Reverse disabled	0: Reverse enabled 1: Reverse disabled	0	○	0x20E
F02.15	Dead time of FWD/REV rotation	0.0~3000.0s	0.0s	○	0x20F
F02.16	The protection of the electric terminals	0: Invalid operation command on terminal 1: valid operation command on terminal	0	○	0x210
F02.17	Select restart after power failure	0: prohibit restart 1: allow restart	0	○	0x211
F02.18	RESERVED				—
F02.19	Energy braking seclection	0: Disable 1: Enable	1	○	0x213
F02.20	Energy braking threshold voltage	600.0~800.0V	700V	○	0x214
F02.21	Brake use ratio	0.0%~100.0%	100.0%	○	0x215
F02.22	The coefficient of Magnetic flux braking	1~100%: The bigger the coefficient, the stronger the braking is)	0.0%	○	0x216

Function code	Name	Setup range	Default Value	Modification	Add.
Group F03 Acc/Dec Parameters					
F03.00	Acc-time 1	0.0~6500.0s	Model dependent	○	0x300
F03.01	Dec-time 1	0.0~6500.0s	Model dependent	○	0x301
F03.02	ACC time2	0.0~6500.0s	Model dependent	○	0x302
F03.03	DEC time2	0.0~6500.0s	Model dependent	○	0x303
F03.04	ACC time3	0.0~6500.0s	Model dependent	○	0x304
F03.05	DEC time3	0.0~6500.0s	Model dependent	○	0x305
F03.06	ACC time4	0.0~6500.0s	Model dependent	○	0x306
F03.07	DEC time4	0.0~6500.0s	Model dependent	○	0x307
F03.08	Jogging ACC time	0.0~6500.0s	20.0s	○	0x308
F03.09	Jogging DEC time	0.0~6500.0s	20.0s	○	0x309
F03.10	Switching frequency of ACC time 1, 2	0.00~F01.07(Max. frequency)	0.00Hz	○	0x30A
F03.11	Switching frequency of DEC time 1, 2	0.00~F01.07(Max. frequency)	0.00Hz	○	0x30B
F03.12	ACC/DEC selection	0: Linear type 1: S-curve type	0	×	0x30C
F03.13	S curve start ratio	0.0~(100.0~F03.14)%	30.0%	×	0x30D
F03.14	S curve end ratio	0.0~(100.0~F03.13)%	30.0%	×	0x30E

Function code	Name	Setup range	Default Value	Modifi-cation	Modifi-cation
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: 2.0en power V/F curve 3: V/F separation	0	X	0x400
F04.01	V/F frequency 1 of motor 1	0.00Hz~F04.03	0.00Hz	X	0x401
F04.02	V/F Voltage 1 of motor 1	0.0%~100.0%(motor1 rated voltage)	0.0%	X	0x402
F04.03	V/F frequency 2 of motor 1	F04.01~F04.05	25.00Hz	X	0x403
F04.04	V/F Voltage 2 of motor 1	0.0%~100.0%(motor1 rated voltage)	50.0%	X	0x404
F04.05	V/F frequency 3 of motor 1	F04.03~F02.02 (motor1 rated frequency)	50.00Hz	X	0x405
F04.06	V/F Voltage 3 of motor 1	0.0%~100.0%(motor1 rated voltage)	100.0%	X	0x406
F04.07	Torque boost of motor 1	0.0%(automatic torque boost) 0.1%~30.0%(Manual torque boost)	Model de-pendent	○	0x407
F04.08	Frequency limit of torque boost of motor1	0.00~F01.07(Max. frequency)	50.00Hz	X	0x408
F04.09	V/F oscillation suppres-sion gain of motor 1	0~100	Model de-pendent	○	0x409
F04.10	RESERVED				—
F04.11	RESERVED				—
F04.12	RESERVED				—
F04.13	RESERVED				—
F04.14	RESERVED				—
F04.15	RESERVED				—
F04.16	RESERVED				—

Function code	Name	Setup range	Default Value	Modification	Add.
F04.17	Torque boost of motor 2	0.0%(automatic torque boost) 0.1%~30.0%(Manual torque boost)	Model dependent	○	0x411
F04.18	Frequency limit of torque boost of motor2	0.00~F01.07(Max. frequency)	50.00Hz	X	0x412
F04.19	V/F oscillation suppres--sion gain of motor2	0~100	Model dependent	○	0x413
F04.20	V/F slip compensation gain of motor 2	0.0~200.0%	100%	○	0x414
F04.21	Droop control	0.0~100.0%	0.0%	○	0x415
F04.22	Voltage setting on V/F separated pattern	0: Keypad digital setting(F04.23) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Multi-step Freq running setting 7: Simple PLC program setting 8: PID control setting 9: Communication setting	0	○	0x416
F04.23	Keypad setting voltage	0.0~Motor rated voltage	0.0v	○	0x417
F04.24	Voltage ACC time	0.0~1000.0s	0.0s	○	0x418
F04.25	Voltage DEC time	0.0~1000.0s	0.0s	○	0x419
F04.26	Automatic current limit action selection	0: Disable 1: Enable	1	X	0x41A
F04.27	Automatic current limit	50.0~200.0%	160%	X	0x41B
F04.28	RESERVED				—
F04.29	RESERVED				—
F04.30	Over-voltage stall protection	0: Invalid 1: Stall protection mode 1 2: Stall protection mode 2	1	X	0x41E
F04.31	Voltage protection of over-voltage stall	650.0V~800.0V	720.0V	X	0x41F

Function code	Name	Setup range	Default Value	Modification	Add.
Group F05 Motor 1 Parameter Group					
F05.00	Motor 1 type	0: Ordinary asynchronous motor (with low frequency compensation) 1: AC drive motor (without low frequency compensation)	0	×	0x500
F05.01	Rated power of motor 1	0.1~1000.0kW	Model dependent	×	0x501
F05.02	Rated voltage of motor 1	0~1200V	Model dependent	×	0x502
F05.03	Rated current of motor 1	0.1~6000.0A	Model dependent	×	0x503
F05.04	Rated frequency of motor 1	0.01~F01.07(Max. frequency)	50.00Hz	×	0x504
F05.05	Rated speed of motor1	1~36000rpm	Model dependent	×	0x505
F05.06	Stator resistance of motor 1	0.001~65.535Ω	Model dependent	×	0x506
F05.07	rotor resistance of motor 1	0.001~65.535Ω	Model dependent	×	0x507
F05.08	leakage inductance of motor 1	0.01~655.35mH	Model dependent	×	0x508
F05.09	Mutual inductance of motor 1	0.01~655.35mH	Model dependent	×	0x509
F05.10	Non-load current of motor 1	0.1A~F05.03	Model dependent	×	0x50A
F05.16	Encoder type	0: ABZ incremental encoder 2: Resolver	0	×	0x510
F05.17	Encoder pulses per revolution	1~65535	1024	×	0x511
F05.18	A/B phase sequence of ABZ incremental encoder	0: Forward 1: Reserve	0	×	0x512
F05.19	Number of pole pairs of resolver	1~65535	1	×	0x513
F05.25	Encoder disconnection fault detection time	0:No detection 1:0.1s~10.0s	0.0	×	0x519
F05.26	Motor 1 parameter autotuning	0: No operation 1: Rotation autotuning 2: Static autotuning	0	×	0x51A

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F06: Motor 1 Vector Control Parameters					
F06.00	Speed loop proportional gain 1	1~100	30	○	0x600
F06.01	Speed loop integral time 1	0.01~10.000s	0.50s	○	0x601
F06.02	Low switching frequency	0.00Hz~F06.05	5.00Hz	○	0x602
F06.03	Speed loop proportional gain 2	1~100	20	○	0x603
F06.04	Speed loop integral time 2	0.01~10.00s	1.0s	○	0x604
F06.05	High switching frequency	F06.02~F01.07（Max. frequency）	10.00Hz	○	0x605
F06.06	ASR feedback input filtering time	0.000~0.100s	0.015s	○	0x606
F06.07	Current loop percentage coefficient KP1	0~60000	Model de-pendent	○	0x607
F06.08	Current loop integral coefficient KI1	0~60000	Model de-pendent	○	0x608
F06.09	Current loop percentage coefficient KP2	0~60000	Model de-pendent	○	0x609
F06.10	Current loop integral coefficient KI2	0~60000	Model de-pendent	○	0x60A
F06.11	Electric torque upper limit setting source selection	0: Keypad digital setting(F06.13) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F06.13.	Model de-pendent	○	0x60B
F06.12	Braking torque upper limit setting source selection	0: Keypad digital setting(F06.14) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F06.14.	Model de-pendent	○	0x60C

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.13	Keypad digital setting of electric torque	0.0~200.0%（Motor rated current）	150.0%	○	0x60D
F06.14	Keypad digital setting of braking torque	0.0~200.0%（Motor rated current）	150.0%	○	0x60E
F06.15	Torque limit coefficient influx weakening	50~200	100	○	0x60F
F06.16	Compensation coefficient of slip	50%~200%	100%	○	0x610

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F07 Motor 2 Parameter Group					
F07.00	Motor 2 type	0: Ordinary asynchronous motor (with low-frequency compensation) 1: AC drive motor (without low frequency compensation)	0	×	0x700
F07.01	Rated power of motor 2	0.1~1000.0kW	Model de-pendent	×	0x701
F07.02	Rated voltage of motor 2	0~1200V	Model de-pendent	×	0x702
F07.03	Rated current of motor 2	0.1~6000.0A	Model de-pendent	×	0x703
F07.04	Rated frequency of motor 2	0.01~F01.07(Max. frequency)	50.00Hz	×	0x704
F07.05	Rated speed of motor2	1~36000rpm	Model de-pendent	×	0x705
F07.06	Stator resistance of motor 2	0.001~65.535Ω	Model de-pendent	×	0x706
F07.07	Rotor resistance of motor 2	0.001~65.535Ω	Model de-pendent	×	0x707
F07.08	leakage inductance of motor 2	0.01~655.35mH	Model de-pendent	×	0x708
F07.09	Mutual inductance of motor 2	0.01~655.35mH	Model de-pendent	×	0x709
F07.10	Non-load current of motor 2	0.1A~F07.03	Model de-pendent	×	0x70A
F07.16	Encoder type	0: ABZ incremental encoder 1: Resolver	0	×	0x710
F07.17	Encoder pulses per revolution	1~65535	1024	×	0x711
F07.18	A/B phase sequence of ABZ incremental encoder	0: Forward 1: Reserve	0	×	0x712
F07.19	Number of pole pairs of resolver	1~65535	1	×	0x713
F07.25	Encoder disconnection fault detection time	0: No detection 0.1s~10.0s	0.0	×	0x719
F07.26	Motor 2 parameter autotuning	0: No operation 1: Rotation autotuning 2: Static autotuning	0	×	0x71A

Function code	Name	Setup range	Default Value	Modification	Add.
Group F08: Motor 2 Vector Control Parameters					
F08.00	Speed loop proportional gain 1	1~100	30	○	0x800
F08.01	Speed loop integral time 1	0.01~10.00s	0.50s	○	0x801
F08.02	Low switching frequency	0.00Hz~F08.05	5.00Hz	○	0x802
F08.03	Speed loop proportional gain 2	1~100	20	○	0x803
F08.04	Speed loop integral time 2	0.01~10.00s	1.0s	○	0x804
F08.05	High switching frequency	F08.02~F01.07（Max. frequency）	10.00Hz	○	0x805
F08.06	ASR feedback input filtering time	0.000~0.100s	0.015s	○	0x806
F08.07	Current loop percentage coefficient KP1	0~60000	Model dependent	○	0x807
F08.08	Current loop integral coefficient KI1	0~60000	Model dependent	○	0x808
F08.09	Current loop percentage coefficient KP2	0~60000	Model dependent	○	0x809
F08.10	Current loop integral coefficient KI2	0~60000	Model dependent	○	0x80A
F08.11	Electric torque upper limit setting source selection	0: Keypad digital setting(F08.13) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F08.13.	Model dependent	○	0x80B
F08.12	Braking torque upper limit setting source selection	0: Keypad digital setting(F08.14) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F08.14.	Model dependent	○	0x80C

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F08.13	Keypad digital setting of electric torque	0.0~200.0%（Motor rated current）	150.0%	○	0x80D
F08.14	Keypad digital setting of braking torque	0.0~200.0%（Motor rated current）	150.0%	○	0x80E
F08.15	Torque limit coefficient influx weakening	50~200	100	○	0x80F
F08.16	Compensation coefficient of slip	50%~200%	100%	○	0x810

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group **F09:** Torque Control Parameters					
F09.00	Speed/Torque control selection	0: Speed control 1: Torque control	0	X	0x900
F09.01	Torque setting source in torque control	0: Keypad digital setting(F09.02) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting	0	○	0x901
F09.02	Torque digital setting in torque control	-200.0%~200.0%	150.0%	○	0x902
F09.03	ACC time in torque control	0.00~650.00s	0.00s	○	0x903
F09.04	DEC time in torque control	0.00~650.00s	0.00s	○	0x904
F09.05	Torque control forward rotation upper limit frequency setting source selection	0: Keypad digital setting(F09.06) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F09.06	0	○	0x905
F09.06	Torque control forward rotation upper limit frequency keyboard limit value	0.00Hz~F01.07（Max. frequency）	50.0Hz	○	0x906
F09.07	Torque control reverse rotation upper limit frequency setting source selection	0: Keypad digital setting(F09.08) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F9.08.	0	○	0x907
F09.08	Torque control reverse upper limit frequency keyboard limit value	0.00Hz~F01.07（Max. frequency）	50.0Hz	○	0x908

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.09	Low-frictiontorque compensation	0.0~100.0%(motor rated torque)	0.0%	○	0x909
F09.10	High-frictiontorque compensation	0.0~100.0%(motor rated torque)	0.0%	○	0x90A
F09.11	Coefficient of inertia compensation	0.0~100.0%(motor rated torque)	0.0%	○	0x90B

Function code	Name	Setup range		Default Value	Modification	Add.
Group F10: Keypad Operation and LED Display						
F10.00	The key of S function selection	0: No function 1: Forward jog 2: Reverse jog 3: Forward/reverse switchover 4: Run command sources shifted 5: Clear the date of exact stop		1	×	0x0A00
F10.01	Display parameter setting 1 on run status	0~65535 BIT0: Running frequency(Hz ON) BIT1: Setting frequency(Hz flash) BIT2: Bus voltage(V ON) BIT3: Output voltage(V ON) BIT4: Output current(A ON) BIT5: Motor speed(rpm ON) BIT6: Output power(% ON) BIT7: Output torque(% ON) BIT8: PID reference (% ON) BIT9: PID feedback(% ON) BIT10: Input terminal state BIT11: Output terminal state BIT12: AI1(V on) BIT13: AI2(V on) BIT14: AI3(V on) BIT15: Linear speed Note: If you want to display the above parameters, add the corresponding decimal to enter this parameter	$2^0=1$ $2^1=2$ $2^2=4$ $2^3=8$ $2^4=16$ $2^5=32$ $2^6=64$ $2^7=128$ $2^8=256$ $2^9=512$ $2^{10}=1024$ $2^{11}=2048$ $2^{12}=4096$ $2^{13}=8192$ $2^{14}=16384$ $2^{15}=32768$	53	○	0x0A01
F10.02	Display parameter setting 2 on run status	0~65535 BIT0: PLC current stage BIT1: Pulse count value BIT2: Length value BIT3: Torque setting value(% ON) BIT4: Pulse Di5 frequency BIT5: Load speed BIT6: IGBT temperature BIT7: AC input voltage BIT8: Encoder feedback speed BIT9~BIT15: Reserve Note: If you want to display the above parameters, add the corresponding decimal to enter this parameter	$2^0=1$ $2^1=2$ $2^2=4$ $2^3=8$ $2^4=16$ $2^5=32$ $2^6=64$ $2^7=128$ $2^8=256$	0	○	0x0A02
F10.03	RESERVED					—

Function code	Name	Setup range	Default Value	Modification	Add.
F10.04	Display parameter setting on stop status	0~65535 BIT0: Setting frequency(Hz ON) BIT1: Motor speed(rpm ON) BIT2: Bus voltage(V ON) BIT3: AC input voltage BIT4: Input terminal state BIT5: Output terminal state BIT6: PID reference (% ON) BIT7: PID feedback(% ON) BIT8: AI1(V on) BIT9: AI2(V on) BIT10: AI3(V on) BIT11: Length value BIT12: Pulse count value BIT13: PLC current stage BIT14: Load speed BIT15: Pulse Di5 frequency Note: If you want to display the above parameters, add the corresponding decimal to enter this parameter $2^0=1$ $2^1=2$ $2^2=4$ $2^3=8$ $2^4=16$ $2^5=32$ $2^6=64$ $2^7=128$ $2^8=256$ $2^9=512$ $2^{10}=1024$ $2^{11}=2048$ $2^{12}=4096$ $2^{13}=8192$ $2^{14}=16384$ $2^{15}=32768$	7	○	0x0A04
F10.05	RESERVED				0x0A05
F10.06	Auxiliary Monitoring	The parameter value is consistent with the monitoring parameter group F99	2	○	0x0A06
F10.07	RESERVED				—
F10.08	RESERVED				—
F10.09	Load speed display coefficient	0.001~ 65. 000	1.000	○	0x0A09
F10.10	Number of decimal places for loadspeed display	0.Zero decimal point 1.One decimal point 2.Two decimal points 3.Three decimal points	0	○	0x0A0A

Function code	Name	Setup range	Default Value	Modifi-cation	Modifi-cation
Group F11 Digital Input Terminal Group					
F11.00	DI1 terminals function selection	0: No function 1: Forward 2: Reverse 3: Three-wire control operation 4: Forward Jogging 5: Reverse Jogging 6: Coast to stop 7: External STOP terminal 1 8: External STOP terminal 2(DEC time4) 9: Immediate DC injection braking 10: DEC DC injection braking 11: Run Pause 12: Fault reset 13: Shift the command 1 14: Shift the command 2 15: Shift frequency command 16: Terminal UP 17: Terminal DOWN 18: Clear UP/DOWN (including∧/∨ key) adjustment 19: Multi-step speed terminal K1 20: Multi-step speed terminal K2 21: Multi-step speed terminal K3 22: Multi-step speed terminal K4 23: PLC status reset 24: PID parameters switching 25: PID second digital given switching terminal 26: PID action direction reverse 27: PID pause 28: Pulse input (valid only for DI5) 29: Swing pause 30: Counter input 31: Counter reset 32: Length count input 33: Length reset 34: Clear the current running time 35: Reverse prohibited 36: DEC/ACC time 1 37: DEC/ACC time 2 38: DEC/ACC disabling 39: External fault input 1 40: External fault input 2 41: Motor 1/2 switchover 42: Speed control/Torque control switchover 43: Torque control prohibited	1	×	0x0B00
F11.01	DI2 terminals function selection		2	×	0x0B01
F11.02	DI3 terminals function selection		4	×	0x0B02
F11.03	DI4 terminals function selection		12	×	0x0B03
F11.04	DI5 terminals function selection		0	×	0x0B04
F11.05	DI6 terminals function selection (extension card function)		0	×	0x0B05
F11.06	DI7 terminals function selection (extension card function)		0	×	0x0B06
F11.07	DI8 terminals function selection (extension card function)		0	×	0x0B07
F11.08	DI9 terminals function selection (extension card function)		0	×	0x0B08
F11.09	DI10 terminals function selection (extension card function)		0	×	0x0B09

Function code	Name	Setup range	Default Value	Modification	Add.
F11.10	Filtering time of digital input terminal	0.000~1.000s	0.010s	○	0x0B0A
F11.11	DI active mode selection 1	0:Positive logic 1:Negative logic Units position: DI1 active mode Tens position: DI2 active mode Hundreds position: DI3 active mode Thousand position: DI4 active mode Ten thousands position: DI5 active mode	00000	X	0x0B0B
F11.12	DI active mode selection 2	0:Positive logic 1:Negative logic Units position: DI6 active mode Tens position: DI7 active mode Hundreds position: DI8 active mode Thousand position: DI9 active mode Ten thousands position: DI10 active mode	00000	X	0x0B0C
F11.13	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	X	0x0B0D
F11.14	Terminal UP/DOWN rate	0.001Hz/s ~ 65.000Hz/s	1.000Hz	○	0x0B0E
F11.15	Switch-on delay of DI1 terminal	0.0~3600.0s	0.0s	X	0x0B0F
F11.16	Switch-off delay of DI1 terminal	0.0~3600.0s	0.0s	X	0x0B10
F11.17	Switch-on delay of DI2 terminal	0.0~3600.0s	0.0s	X	0x0B11
F11.18	Switch-off delay of DI2 terminal	0.0~3600.0s	0.0s	X	0x0B12
F11.19	Switch-on delay of DI3 terminal	0.0~3600.0s	0.0s	X	0x0B13
F11.20	Switch-off delay of DI3 terminal	0.0~3600.0s	0.0s	X	0x0B14

Function code	Name	Setup range	Default Value	Modification	Add.
Group F12 Digital Output Terminal Group					
F12.00	HDO output	0: Open collector pole high speed pulse output(See F15.02 for detailed information of the related function) 1: Open collector pole output (See F12.02 for detailed information of the related function)	0	○	0x0C00
F12.01	DO1 output	0: Invalid 1: AC drive running 2: Forward running 3: Reverse running 4: Jogging running 5: Zero-speed running 6: Ready for operation 7: AC drive fault 8: AC drive overload pre-alarming 9: Motor overload pre-alarming 10: AC drive underload pre-alarming 11: Frequency arrival 12: Upper limit Freq attained 13: Lower limit Freq attained 14: Frequency detection FDT1 15: Frequency detection FDT2 16: Frequency 1 reached 17: Frequency 2 reached 18: Reserved 19: Completion of PLC stage 20: Completion of PLC Circle 21: PID sleeping 22: Current 1 reached 23: Current 2 reached 24: Load status 25: Setting count value attained 26: Designated count value attained 27: Setting length attained 28: Designated length attained 29: Setting running time reached 30: Communication setting 31: Output DI1 32: Output Di2 33: Limit the output Di1 34: AI1 input limit exceeded 35: Brake control 36: PID feedback offline 37: Motor overheat warning	0	○	0x0C01
F12.02	HDO output		0	○	0x0C02
F12.03	Relay T1 output		1	○	0x0C03
F12.04	Relay T2 output		7	○	0x0C04
F12.05	Relay T2 output		0	○	0x0C05
F12.06	Polarity of output terminals	0:Positive logic 1:Negative logic Units position: D01 active mode Tens position: HDO active mode Hundreds position: T1 active mode Thousand position: T2 active mode Ten thousands position: T3 active mode	0	○	0xC06

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.07	DO1 switch-on delay time	0.0~3600.0s	0.0s	○	0x0C07
F12.08	DO1 switch-off delay time	0.0~3600.0s	0.0s	○	0x0C08
F12.09	HDO switch-on delay time	0.0~3600.0s	0.0s	○	0x0C09
F12.10	HDO switch- off delay time	0.0~3600.0s	0.0s	○	0x0C0A
F12.11	T1 switch-on delay time	0.0~3600.0s	0.0s	○	0x0C0B
F12.12	T1 switch-off delay time	0.0~3600.0s	0.0s	○	0x0C0C
F12.13	T2 switch-on delay time	0.0~3600.0s	0.0s	○	0x0C0D
F12.14	T2 switch-off delay time	0.0~3600.0s	0.0s	○	0x0C0E
F12.15	RESERVED				—
F12.16	RESERVED				—
F12.17	Frequency arrival detection value	0.0%~100.0%	0.0%	○	0x0C11
F12.18	FDT1 frequency detection value	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C12
F12.19	FDT1 frequency detection hysteresis	0.0%~100.0%	5.0%	○	0x0C13
F12.20	FDT2 frequency detection value	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C14
F12.21	FDT2 frequency detection hysteresis	0.0%~100.0%	5.0%	○	0x0C15
F12.22	Detection of any frequency 1	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C16
F12.23	Detection width of any frequency 1	0.0%~100.0%(Max. frequency)	0	○	0x0C17
F12.24	Detection of any frequency 2	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C18
F12.25	Detection width of any frequency 2	0.0%~100.0%(Max. frequency)	0	×	0x0C19

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.26	Upper limit of load current	0.0%~300.0%(Motor rated current)	100.0%	×	0x0C1A
F12.27	Lower limit of load current	0.0%~300.0%(Motor rated current)	50.0%	×	0x0C1B
F12.28	Any current reaching 1 value	0.0%~300.0%(Motor rated current)	100.0%	○	0x0C1C
F12.29	Any current reaching 1 amplitude	0.0%~300.0%(Motor rated current)	0.0%	○	0x0C1D
F12.30	Any current reaching 2 value	0.0%~300.0%(Motor rated current)	100.0%	○	0x0C1E
F12.31	Any current reaching 2 amplitude	0.0%~300.0%(Motor rated current)	0.0%	○	0x0C1F
F12.32	AI1 input voltage lower limit	0.0V~F12.33	3. 0V	○	0x0C20
F12.33	AI1 input upper limit voltage	F12.32~10.00V	7.0V	○	0x0C21
F12.34	Mechanical brake control	0: Disabled 1: Enabled	0	×	0x0C22
F12.35	Mechanical brake open frequency	0.00Hz~10.00Hz	2.5Hz	×	0x0C23
F12.36	Mechanical brake open current	0.0%~200.0%	150.0%	×	0x0C24
F12.37	Accel delay time after brake open	0.0s~10.0s	1.0S	○	0x0C25
F12.38	Mechanical brake Freq	0.00Hz~10.00Hz	2.0Hz	×	0x0C26
F12.39	Mechanical brake close waiting time	0.0s~10.0s	1.0S	○	0x0C27
F12.40	Mechanical brake holding time	0.0s~10.0s	0.5S	○	0x0C28

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F14 Analog Curve And Pulse Input Setting Function Group					
F14.00	Lower limit of AI1	0.00V~ F14.02	0.00V	○	0x0E00
F14.01	Corresponding setting of the lower limit of AI1	-100.0%~100.0%	0.0%	○	0x0E01
F14.02	Ai1 inflexion 1 input	F14.00~F14.04	3.00V	○	0x0E02
F14.03	Corresponding percentage of AI1 inflexion 1 input	-100.0%~100.0%	30.0%	○	0x0E03
F14.04	Ai1 inflexion 2 input	F14.02~F14.06	6.00V	○	0x0E04
F14.05	Corresponding percentage of AI1 inflexion 2 input	-100.0%~100.0%	60.0%	○	0x0E05
F14.06	Upper limit of AI1	F14.04~10.00V	10.00V	○	0x0E06
F14.07	Corresponding setting of the upper limit of AI1	-100.0%~100.0%	100.0%	○	0x0E07
F14.08	Ai1 input filter time	0.00s~10.00s	0.100s	○	0x0E08
F14.09	Lower limit of AI2	0.00V~ F14.11	0.00V	○	0x0E09
F14.10	Corresponding setting of the lower limit of AI2	-100.0%~100.0%	0.0%	○	0x0E0A
F14.11	Ai2 inflexion 1 input	F14.09~F14.13	3.00V	○	0x0E0B
F14.12	Corresponding percentage of AI2 inflexion 1 input	-100.0%~100.0%	30.0%	○	0x0E0C
F14.13	AI2 inflexion 2 input	F14.11~F14.15	6.00V	○	0x0E0D
F14.14	Corresponding percentage of AI2 inflexion 2 input	-100.0%~100.0%	60.0%	○	0x0E0E
F14.15	Upper limit of AI2	F14.13~10.00V	10.00V	○	0x0E0F
F14.16	Corresponding setting of the upper limit of AI2	-100.0%~100.0%	100.0%	○	0x0E10
F14.17	AI2 input filter time	0.00s~10.00s	0.100s	○	0x0E11
F14.18	Lower limit of AI3	-10.00V~ F14.20	-10.00V	○	0x0E12
F14.19	Corresponding setting of the lower limit of AI3	-100.0%~100.0%	-100.0%	○	0x0E13
F14.20	AI 3 inflexion 1 input	F14.18~F14.22	-3.00V	○	0x0E14
F14.21	Corresponding percentage of AI3 inflexion 1 input	-100.0%~100.0%	-30.0%	○	0x0E15

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F14.22	AI3 inflexion 2 input	F14.20~F14.24	3.00V	○	0x0E16
F14.23	Corresponding percentage of AI3 inflexion 2 input	-100.0%~100.0%	30.0%	○	0x0E17
F14.24	Upper limit of AI 3	F14.22~10.00V	10.00V	○	0x0E18
F14.25	Corresponding setting of the upper limit of AI3	-100.0%~100.0%	100.0%	○	0x0E19
F14.26	Ai3 input filter time	0.00s~10.00s	0.10s	○	0x0E1A
F14.27	AI lower than Min. input setting selection	000~111 Ones: AI1 lower than minimum input setting selection 0: Corresponding percentage of min. input 1:0. 0% Tens: AI2 lower than minimum input setting selection（As above) Hundreds: AI3 lower than minimum input setting selection(As above)	0x000	○	0x0E1B
F14. 28	Lower limit frequency of pulse DI5	0.00kHz~F14.30	0.00 kHz	○	0x0E1C
F14. 29	Corresponding setting of lower limit frequency of pulse DI5	-100.0%~100.0%	0.0%	○	0x0E1D
F14. 30	Upper limit frequency of pulse DI5	F14.28~100.00kHz	50.00 kHz	○	0x0E1E
F14. 31	Corresponding setting of upper limit frequency of pulse DI5	-100.0%~100.0%	100.0%	○	0x0E1F
F14. 32	Input filter time of pulse DI5	0.00s~10.00s	0.10s	○	0x0E20

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F15 Analog Curve And Pulse Output Setting Function Group					
F15.00	AO1 output	0: Running frequency 1: Setting frequency 2: Output current (relative to twice rated current of the motor) 3: Output voltage 4: High speed pulse DI5 input value 5: Analog AI1 input value 6: Analog AI2 input value 7: Analog AI3 input value 8: Length 9: Count value 10: Running time 11: Output torque 12: Output power 13: Communication setting 14: Keypad potentiometer setting	0	○	0x0F00
F15.01	AO2 output		1	○	0x0F01
F15.02	HDO output		0	○	0x0F02
F15.03	Lower output limit of AO1	0.0%~F15.05	0.0%	○	0x0F03
F15.04	Corresponding AO1 output of lower limit	0.00V~10.00V	0.00V	○	0x0F04
F15.05	Upper output limit of AO1	F15.03~100.0%	100.0%	○	0x0F05
F15.06	The corresponding AO1 output of upper limit	0.00V~10.00V	10.00V	○	0x0F06
F15.07	Lower output limit of AO2	0.0%~F15.09	0.0%	○	0x0F07
F15.08	Corresponding AO2 output of lower limit	0.00V~10.00V	0.0%	○	0x0F08
F15.09	Upper output limit of AO2	F15.07~100.0%	100.0%	○	0x0F09
F15.10	The corresponding AO2 output of upper limit	0.00V~10.00V	10.00V	○	0x0F0A
F15.11	Lower output limit of HDO	0.0%~F15.13	0.0%	○	0x0F0B
F15.12	Corresponding HDO output of lower limit	0.00~100.00kHz	0.00Hz	○	0x0F0C
F15.13	Upper output limit of HDO	F15.11~100.0%	100.0%	○	0x0F0D
F15.14	Corresponding HDO output of upper limit	0.00~100.00kHz	100.00 kHz	○	0x0F0E

Function code	Name	Setup range	Default Value	Modification	Add.
Group F16 AI/AO Correction Group					
F16.00	AI,AO corrective active selection	0: No action 1: AI1 channel correction 2: AI2 channel correction 3: AI3 channel correction 4: AO1 channel correction 5: AO2 channel correction	0	○	0x1000
F16.01	AI1 measured voltage1	0.000V~10.000V	Correction before delivery	○	0x1001
F16.02	AI1 display voltage1	0.000V~10.000V		○	0x1002
F16.03	AI1 measured voltage2	0.000V~10.000V		○	0x1003
F16.04	AI1 display voltage 2	0.000V~10.000V		○	0x1004
F16.05	AI2 measured voltage1	0.000V~10.000V		○	0x1005
F16.06	AI2 display voltage1	0.000V~10.000V		○	0x1006
F16.07	AI2 measured voltage 2	0.000V~10.000V		○	0x1007
F16.08	AI2 display voltage 2	0.000V~10.000V		○	0x1008
F16.09	AI3 measured voltage 1	0.000V~10.000V		○	0x1009
F16.10	AI3 display voltage 1	0.000V~10.000V		○	0x100A
F16.11	AI3 measured voltage 2	0.00V~10.000V		○	0x100B
F16.12	AI3 display voltage 2	0.00V~10.000V		○	0x100C
F16.13	AO1 measured voltage 1	0.000V~10.000V		○	0x100D
F16.14	AO1 display voltage 1	0.000V~10.000V		○	0x100E
F16.15	AO1 measured voltage 2	0.000V~10.000V		○	0x100F
F16.16	AO1 display voltage 2	0.000V~10.000V		○	0x1010
F16.17	AO2 measured voltage1	0.000V~10.000V		○	0x1011
F16.18	AO2 display voltage1	0.000V~10.000V		○	0x1012
F16.19	AO2 measured voltage 2	0.000V~10.000V		○	0x1013
F16.20	AO2 display voltage 2	0.000V~10.000V		○	0x1014

Function code	Name	Setup range	Default Value	Modifi-cation	Modifi-cation
Group F18 Serial Communication Function Group					
F18.00	Local communication address	0~247 0: Broadcast address 1: Slaver address	1	○	0x1200
F18.01	Communication baud rate	Units position : Modbus Communication baud rate 0: 300 BPS 1: 600 BPS 2: 1200 BPS 3: 2400 BPS 4: 4800 BPS 5: 9600 BPS 6: 19200 BPS 7: 38400 BPS 8: 57600 BPS 9: 115200 BPS Tens position : CAN Communication baud rate 0:20 KBPS 1:50 KBPS 2:100 KBPS 3:125 KBPS 4:250 KBPS 5:500 KBPS 6:1 MBPS	45	○	0x1201
F18.02	Data format symbol	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No check, data format (8-N-1)	0	○	0x1202
F18.03	Answer delay	0~20ms	2ms	○	0x1203
F18.04	Fault time of communication overtime	0.0s (Invalid); 0.1~60.0s	0.0s	○	0x1204
F18.05	Transmission fault proccessing	0: Alarm and stop freely 1: Alarm and stop according to the stop mode 2: No alarm and continue to run	0	○	0x1205
F18.06	Current resolution readby communication	0: 0.01A 1: 0.1A	0	○	0x1206
F18.07	Modbus Protocol compatibility selection	0: KM600 protocol	0	○	0x1207
F18.08	RESERVE				—

Function code	Name	Setup range	Default Value	Modifi-cation	Add
F18.09	Communication protocol selection	Units position: Communication run command channel selection 0: Modbus 1: Profibus-DP 2: CAN 3: CANopen Tens position : Communication protocol selection 0: Modbus 1: CANopen	00	○	0x1209
F18.10	PPO type	0: PPO1 format 1: PPO2 format 2: PPO3 format 3: PPO4 format 4: PPO5 format	2	×	0x120A
F18.11	DP slave address	1~127	1	×	0x120B
F18.12	PZD3 Write	0: No operation 1: Communication setting frequency 2: PID Given value(0~PID range) 3: PID feedback(0~PID range) 4: Torque setting value(-10000~10000) 5: Forward upper limit frequency setting value (0~10000) 6: Reverse upper limit frequency setting value (0~10000) 7: Electric torque upper limit torque(0~10000) 8: Braking torque upper limit torque(0~10000) 9: Virtual output terminal command 10: Voltage setting (V/F separation purpose)(0~1000) 11: AO1 output setting (0~0X7FFF) 12: AO2 output setting (0~0X7FFF) 13: HDO output setting (0~0X7FFF)	0	○	0x120C
F18.13	PZD4 Write		0	○	0x120D
F18.14	PZD5 Write		0	○	0x120E
F18.15	PZD6 Write		0	○	0x120F
F18.16	PZD7 Write		0	○	0x1210
F18.17	PZD8 Write		0	○	0x1211
F18.18	PZD9 Write		0	○	0x1212
F18.19	PZD10 Write		0	○	0x1213
F18.20	PZD11 Write		0	○	0x1214
F18.21	PZD12 Write		0	○	0x1215
F18.12	PZD3 Read	0: No-operation 1~40: Corresponding to F99.01~F99.40 41: Running frequency at current fault 42: Output current at current fault 43: Output voltage at current fault 44: Bus voltage at current fault 45: The Max. temperature at current fault 46: Input terminal state at current fault 47: Output terminal state at current fault 48: Inverter status at current fault 49: Power on time at current fault 50: Running time at current fault	0	○	0x1216
F18.13	PZD4 Read		0	○	0x1217
F18.14	PZD5 Read		0	○	0x1218
F18.15	PZD6 Read		0	○	0x1219
F18.16	PZD7 Read		0	○	0x121A
F18.17	PZD8 Read		0	○	0x121B
F18.18	PZD9 Read		0	○	0x121C
F18.19	PZD10 Read		0	○	0x121D
F18.20	PZD11 Read		0	○	0x121E
F18.21	PZD12 Read		0	○	0x121F

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F19 PID Control Group					
F19.00	PID reference source	Units position: PID reference source 0: Keypad potentiometer setting 1: PID digital setting(F19.02) 2: AI1 3: AI2 4: AI3 5: Pulse DI5 6: Communication setting Tens position: PID feedback source 0: AI1 1: AI2 2: AI3 3: AI1+AI2 4: AI1-AI2 5: MAX(AI1,AI2) 6: MIN(AI1,AI2) 7: Pulse DI5 8: Communication setting	01	○	0x1300
F19.01	PID range	0~65535	1000	○	0x1301
F19.02	PID digital 1 setting	0~F19.01	500	○	0x1302
F19.03	PID digital 2 setting	0~F19.01	500	○	0x1303
F19.04	PID operation direction	0: PID output is positive 1: PID output is negative	0	○	0x1304
F19.05	Proportional gain(P1)	0.00~100.0%	20.0%	○	0x1305
F19.06	Intergal time(I1)	0.0~100.0s	2.0s	○	0x1306
F19.07	Differential time(D1)	0.00~10.00s	0.00s	○	0x1307
F19.08	PID offse limit	0.00~50.0%	0.0%	○	0x1308
F19.09	PID differential limit	0.0%~100.0%	1.0%	○	0x1309
F19.10	PID reference change time	0.00~650.00s	0.00s	○	0x130A
F19.11	PID feedback filter time	0.00~60.00s	0.00s	○	0x130B
F19.12	PID output filter time	0.00~60.00s	0.00s	○	0x130C
F19.13	Proportional gain(P2)	0.00~100.0%	20.0%	○	0x130D
F19.14	Intergal time(I2)	0.0~100.0s	2.0s	○	0x130E
F19.15	Differential time(D2)	0.00~10.00s	0.00s	○	0x130F

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.16	Upper limit Freq when opposite to rotary set direction	0.00Hz~F01.07(max. frequency)	0.00Hz	○	0x1310
F19.17	PID Preset Value	0.0%~100.0%	0.0%	○	0x1311
F19.18	PID Preset Value Keeping time	0.0~650.0s	0.00s	○	0x1312
F19.19	PID Hibernate Frequency	0.00Hz~F01.07(max. frequency)	0.0	○	0x1313
F19.20	PID Hibernate Delay Time	0.0~6500.0s	30.0s	○	0x1314
F19.21	PID Awaken Value	0.0~100.0%	0.0%	○	0x1315
F19.22	PID Awaken Value delay time	0.0~6500.0s	0.5s	○	0x1316
F19.23	Upper protective pressure value	0.0%~100.0%	100.0%	○	0x1317
F19.24	Upper limit protection detection time	0.0s~1000.0s	1.0s	○	0x1318
F19.25	Forced sleep deviation	0.0%~50.0%	0.0%	○	0x1319
F19.26	Forced sleep delay time	0.0~6000.0s	0.0s	○	0x131A
F19.27	Detection value of feedback offline	0.0~100.0%	0.0%	○	0x131B
F19.28	Detection time of feedback offline	0.0~6500.0s	0.0s	○	0x131C
F19.29	PID feedback offline processing	0: Alarm and stop freely 1: Alarm and stop according to the stop mode 2: No alarm and continue to run	0	○	0x131D
F19.30	PID range decimal number	0~4	0	○	0x131E

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F20 Swing Frequency, Fixed Length, Count and Timing					
F20.00	Swing Frequency setting mode	0: Relative to center frequency 1: Relative to Max. frequency	0	○	0x1400
F20.01	Swing frequency amplitude	0.0~100.0%	0.0%	○	0x1401
F20.02	Kick frequency amplitude	0.0~50.0%	0.0%	○	0x1402
F20.03	Cycle of swing frequency	0.1s~3000.0s	10.0s	○	0x1403
F20.04	Triangular wave ramp-up time coefficient	0.1%~100.0%	50.0%	○	0x1404
F20.05	Setup length	0~65535m	1000m	○	0x1405
F20.06	Designed length	0~65535m	1m	○	0x1406
F20.07	The number of pulses of each meter	0.1~6553.5	100.0	○	0x1407
F20.08	Set count value	1~65535	1000	○	0x1408
F20.09	Designated count value	1~65535	1	○	0x1409
F20.10	Running time setting	0.0~65535min	0.0Min	○	0x140A
F20.11	Exact stop mode	0: invalid 1: setting length arrive 2: setting count value arrive 3: setting running time arrive	0	○	0x140B

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F21 Simple PLC and Multi-step Freq Control Group					
F21.00	Multi-step Freq 0	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1500
F21.01	Multi-step Freq 1	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1501
F21.02	Multi-step Freq 2	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1502
F21.03	Multi-step Freq 3	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1503
F21.04	Multi-step Freq 4	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1504
F21.05	Multi-step Freq 5	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1505
F21.06	Multi-step Freq 6	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1506
F21.07	Multi-step Freq 7	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1507
F21.08	Multi-step Freq 8	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1508
F21.09	Multi-step Freq 9	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1509
F21.10	Multi-step Freq 10	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150A
F21.11	Multi-step Freq 11	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150B
F21.12	Multi-step Freq 12	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150C
F21.13	Multi-step Freq 13	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150D
F21.14	Multi-step Freq 14	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150E
F21.15	Multi-step Freq 15	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150F
F21.16	Simple PLC running method	Ones : PLC runmode 0: Stop after running once 1: Run at the final value after running once 2: Cycle running Tens : Unit of simple PLC runtime 0: Second (s) 1: Minute (min)	00	○	0x1510
F21.17	Simple PLC memory selection when in power loss	Ones: Power loss memory 0:No memory on power loss 1: Memorized on power loss Tens: Stop memory 0:No memory on stop 1: Memorized on stop	00	○	0x1511
F21.18	The running time of step 0	0.0~6553.5s(min)	0.00s (Min)	○	0x1512

Function code	Name	Setup range	Default Value	Modification	Add.
F21.19	Setting of multi-step 0	Ones :Run direction 0: Forward 1: Reverse Tens: Accel/Decel time 0: Accel/Decel time 1 1: Accel/Decel time 2 2: Accel/Decel time 3 3: Accel/Decel time 4 Hundreds : Freq setting 0: Multi-step Freq 0 (F21.00) 1: Keypad digital setting 2: Keypad potentiometer setting 3: AI1 setting 4: AI2 setting 5: AI3 setting 6: DI5 pulse input 7: Process PID output 8: Communication setting	000	○	0x1513
F21.20	The running time of step 1	0.0~6553.5s(min)	0.0s	○	0x1514
F21.21	Setting of multi-step 1	Same as F21-19	000	○	0x1515
F21.22	The running time of step 2	0.0~6553.5s(min)	0.0s	○	0x1516
F21.23	Setting of multi-step 2	Same as F21-19	000	○	0x1517
F21.24	The running time of step 3	0.0~6553.5s(min)	0.0s	○	0x1518
F21.25	Setting of multi-step 3	Same as F21-19	000	○	0x1519
F21.26	The running time of step 4	0.0~6553.5s(min)	0.0s	○	0x151A
F21.27	Setting of multi-step 4	Same as F21-19	000	○	0x151B
F21.28	The running time of step 5	0.0~6553.5s(min)	0.0s	○	0x151C
F21.29	Setting of multi-step 5	Same as F21-19	000	○	0x151D
F21.30	The running time of step 6	0.0~6553.5s(min)	0.0s	○	0x151E
F21.31	Setting of multi-step 6	Same as F21-19	000	○	0x151F

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F21.32	The running time of step 7	0.0~6553.5s(min)	0.0s	○	0x1520
F21.33	Setting of multi-step 7	Same as F21-19	000	○	0x1521
F21.34	The running time of step 8	0.0~6553.5s(min)	0.0s	○	0x1522
F21.35	Setting of multi-step 8	Same as F21-19	000	○	0x1523
F21.36	The running time of step 9	0.0~6553.5s(min)	0.0s	○	0x1524
F21.37	Setting of multi-step 9	Same as F21-19	000	○	0x1525
F21.38	The running time of step 10	0.0~6553.5s(min)	0.0s	○	0x1526
F21.39	Setting of multi-step 10	Same as F21-19	000	○	0x1527
F21.40	The running time of step 11	0.0~6553.5s(min)	0.0s	○	0x1528
F21.41	Setting of multi-step 11	Same as F21-19	000	○	0x1529
F21.42	The running time of step 12	0.0~6553.5s(min)	0.0s	○	0x152A
F21.43	Setting of multi-step 12	Same as F21-19	000	○	0x152B
F21.44	The running time of step 13	0.0~6553.5s(min)	0.0s	○	0x152C
F21.45	Setting of multi-step 13	Same as F21-19	000	○	0x152D
F21.46	The running time of step 14	0.0~6553.5s(min)	0.0s	○	0x152E
F21.47	Setting of multi-step 14	Same as F21-19	000	○	0x152F
F21.48	The running time of step 15	0.0~6553.5s(min)	0.0s	○	0x1530
F21.49	Setting of multi-step 15	Same as F21-19	000	○	0x1531
F21.50	PLC model	0: PLC model 1 1: PLC model 2	0	○	0x1532

Function code	Name	Setup range	Default Value	Modification	Add.
Group F28 Strengthen Function Groups					
F28.00	Carrier frequency setting	1.0~16.0	Model dependent	○	0x1C00
F28.01	Carrier frequency adjusted with temperature	0: Invalid 1: Valid	1	○	0x1C01
F28.02	PWM mode	0: Three-phase modulation 1: Three-phase and two-phase modulation switching	0	×	0x1C02
F28.03	Random PWM	0: Fixed PWM 1~10: Random PWM coefficient	0	×	0x1C03
F28.04	Voltage over modulation coefficient	100~110	105	×	0x1C04
F28.04	Cooling fan working mode	0: Working during drive running 1: Working continuously	0	×	0x1C05

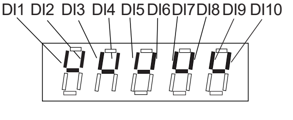
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F29 Protection Parameters Group					
F29.00	Phase loss protection	0x00~0x11 Ones: Input phase loss protection 0: Disable 1: Enable Tens: Output phase loss protection 0: Disable 1: Enable	0x11	×	0x1D00
F29.01	Detection of short-circuit to ground	0x00~0x11 Ones: Detection of short-circuit to ground upon power-on 0: Disable 1: Enable Tens: Before running detection of short-circuit to ground 0: Disable 1: Enable	0x01	×	0x1D01
F29.02	Motor overload protection	0: Invalid 1: Valid	1	×	0x1D02
F29.03	Motor overload protection gain	50~300	100	×	0x1D03
F29.04	Overload pre-alarm setting	0x00~0x12 Ones: Overload pre-alarm proccessing 0: Alarm and stop freely 1: Alarm and stop according to the stop mode 2: No alarm and continue to run Tens: Detection mode 0: Detection all the time 1: Detection in constant running	0x02	○	0x1D04
F29.05	Overload pre-alarm detection	50.0%~200%	150%	○	0x1D05
F29.06	Overload pre-alarm detection time	0.1s~60.0s	1.0s	○	0x1D06
F29.07	Motor underload protection	0: Invalid 1: Valid	0	×	0x1D07
F29.08	Underload pre-alarm detection	0.0%~100%	25%	○	0x1D08
F29.09	Underload pre-alarm detection time	0.1s~60.0s	1.0s	○	0x1D09

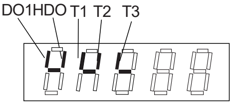
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.10	Underload pre-alarm proccessing	0: Alarm and stop freely 1: Alarm and stop according to the stop mode 2: No alarm and continue to run	0	○	0x1D0A
F29.11	Fault reset times	0~20	0	○	0x1D0B
F29.12	Selection of DO action during auto reset	0: Not act 1: Act	0	○	0x1D0C
F29.13	Delay time of auto reset	0.0s~100.0s	1.0s	○	0x1D0D
F29.14	Detection level of speed error	0.0%~50.0%	20.0%	○	0x1D0E
F29.15	Detection time of speed error	0.0:Don't detection 0.1s~60.0s	5.0s	○	0x1D0F
F29.16	Overspeed detection level	0.0%~50.0%	20.0%	○	0x1D10
F29.17	Overspeed detection time	0.0:Don't detection 0.1s~60.0s	1.0s	○	0x1D11
F29.18	Power dip ride-through function selection	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop	0	×	0x1D12
F29.19	Threshold of power dip ride-through function disabled	80.0%~100.0%	85.0%	×	0x1D13
F29.20	Judging time of bus voltage recovering from power dip	0.0s~100.0s	0.5s	×	0x1D14
F29.21	Threshold of power dip ride-through function enabled	60.0%~100.0%	80.0%	×	0x1D15
F29.22	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0	○	0x1D16
F29.23	Motor overheat protection threshold	0.0~200.0℃	110℃	○	0x1D17
F29.24	Motor overheat pre-warningthreshold	0.0~200.0℃	90℃	○	0x1D18

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F30 User-Defined Parameters Group					
F30. 00	User-Defined Parameter 0	F00. 00~F99.XX	F00.01	○	0x1E00
F30. 01	User-Defined Parameter 1	F00. 00~F99.XX	F02.00	○	0x1E01
F30. 02	User-Defined Parameter 2	F00. 00~F99.XX	F01.00	○	0x1E02
F30. 03	User-Defined Parameter 3	F00. 00~F99.XX	F01.04	○	0x1E03
F30. 04	User-Defined Parameter 4	F00. 00~F99.XX	F01.05	○	0x1E04
F30. 05	User-Defined Parameter 5	F00. 00~F99.XX	F03.00	○	0x1E05
F30. 06	User-Defined Parameter 6	F00. 00~F99.XX	F03.01	○	0x1E06
F30. 07	User-Defined Parameter 7	F00. 00~F99.XX	F04.00	○	0x1E07
F30. 08	User-Defined Parameter 8	F00. 00~F99.XX	F04.07	○	0x1E08
F30. 09	User-Defined Parameter 9	F00. 00~F99.XX	F11.00	○	0x1E09
F30. 10	User-Defined Parameter 10	F00. 00~F99.XX	F11.01	○	0x1E0A
F30. 11	User-Defined Parameter 11	F00. 00~F99.XX	F11.02	○	0x1E0B
F30. 12	User-Defined Parameter 12	F00. 00~F99.XX	F12.03	○	0x1E0C
F30. 13	User-Defined Parameter 13	F00. 00~F99.XX	F15.00	○	0x1E0D
F30. 14	User-Defined Parameter 14	F00. 00~F99.XX	F02.03	○	0x1E0E
F30. 15	User-Defined Parameter 15	F00. 00~F99.XX	F02.09	○	0x1E0F
F30. 16	User-Defined Parameter 16	F00. 00~F99.XX	F28.00	○	0x1E10
F30. 17	User-Defined Parameter 17	F00. 00~F99.XX	F00.00	○	0x1E11
F30. 18	User-Defined Parameter 18	F00. 00~F99.XX	F00.00	○	0x1E12
F30. 19	User-Defined Parameter 19	F00. 00~F99.XX	F00.00	○	0x1E13
F30. 20	User-Defined Parameter 20	F00. 00~F99.XX	F00.00	○	0x1E14
F30. 21	User-Defined Parameter 21	F00. 00~F99.XX	F00.00	○	0x1E15
F30. 22	User-Defined Parameter 22	F00. 00~F99.XX	F00.00	○	0x1E16
F30. 23	User-Defined Parameter 23	F00. 00~F99.XX	F00.00	○	0x1E17
F30. 24	User-Defined Parameter 24	F00. 00~F99.XX	F00.00	○	0x1E18
F30. 25	User-Defined Parameter 25	F00. 00~F99.XX	F00.00	○	0x1E19
F30. 26	User-Defined Parameter 26	F00. 00~F99.XX	F00.00	○	0x1E1A
F30. 27	User-Defined Parameter 27	F00. 00~F99.XX	F00.00	○	0x1E1B
F30. 28	User-Defined Parameter 28	F00. 00~F99.XX	F00.00	○	0x1E1C
F30. 29	User-Defined Parameter 29	F00. 00~F99.XX	F00.00	○	0x1E1D
F30. 30	User-Defined Parameter 30	F00. 00~F99.XX	F00.00	○	0x1E1E
F30. 31	User-Defined Parameter 31	F00. 00~F99.XX	F00.00	○	0x1E1F

<table>
<tr><th>Function code</th><th>Name</th><th>Setup range</th><th>Default Value</th><th>Modifi-cation</th><th>Add.</th></tr>
<tr><td colspan="6">Group F98 History Fault</td></tr>
<tr><td>F98.00</td><td>Current fault type</td><td rowspan="3">0: No fault
1: Inverter module protection(E.OUT)
2: Current detection fault(E.ICE)
3: Short circuit to ground(E.ERH)
4: Input phase loss(E.SPI)
5:Output phase loss(E.SPO)
6: Overcurrent during acceleration(E.OC1)
7: Overcurrent during deceleration(E.OC2)
8: Overcurrent at constant speed(E.OC3)
9: Overvoltage during acceleration(E.OU1)
10: Overvoltage during deceleration(E.OU2)
11: Overvoltage at constant speed(E.OU3)
12: Undervoltage(E.LU)
13: AC drive overload(E.OL1)
14: Motor overload(E.OL2)
15: Motor overload prealarm(E.OL3)
16: Motor underload(E.LL)
17: AC drive overheated(E.OH)
18: Motor auto-tuning fault(E.TUNE)
19: EEPROM read-write fault(E.EEP)
20: External fault 1(E.EF1)
21: External fault 2(E.EF2)
22: Port communication fault(E.CE)
23: PID feedback loss(E.PID)
24: Speed feedback fault(E.EDU)
25: Imbalance fault(E.STO)
26: Encoder fault(E.ECD)
27: Motor overheated fault(E.PTC)
28: Reserve
29: Magnetic pole initial position detection falut(E.PLR)
30: Motor switchover fault during running(E.CH)
31: RESERVE</td><td>-</td><td>*</td><td>0x2200</td></tr>
<tr><td>F98.01</td><td>Previous fault type</td><td>-</td><td>*</td><td>0x2201</td></tr>
<tr><td>F98.02</td><td>Previous 2 fault type</td><td>-</td><td>*</td><td>0x2202</td></tr>
<tr><td>F98.03</td><td>Running frequency at current fault</td><td>----</td><td>----</td><td>*</td><td>0x2203</td></tr>
<tr><td>F98.04</td><td>Output current at current fault</td><td>----</td><td>----</td><td>*</td><td>0x2204</td></tr>
<tr><td>F98.05</td><td>Output voltage at current fault</td><td>----</td><td>----</td><td>*</td><td>0x2205</td></tr>
<tr><td>F98.06</td><td>Bus voltage at current fault</td><td>----</td><td>----</td><td>*</td><td>0x2206</td></tr>
<tr><td>F98.07</td><td>IGBT temperature at current fault</td><td>----</td><td>----</td><td>*</td><td>0x2207</td></tr>
<tr><td>F98.08</td><td>Input terminals state at current fault</td><td>----</td><td>----</td><td>*</td><td>0x2208</td></tr>
<tr><td>F98.09</td><td>Output terminals state at current fault</td><td>----</td><td>----</td><td>*</td><td>0x2209</td></tr>
</table>

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F98.10	AC drive state at current fault	----	----	*	0x220A
F98.11	Power-on time at current fault	----	----	*	0x220B
F98.12	Running time at current fault	----	----	*	0x220C
F98.13	Running frequency at previous fault	----	----	*	0x220D
F98.14	Output current at previous fault	----	----	*	0x220E
F98.15	Output voltage at previous fault	----	----	*	0x220F
F98.16	Bus voltage at previous fault	----	----	*	0x2210
F98.17	IGBT temperature at previous fault	----	----	*	0x2211
F98.18	Input terminals state at previous fault	----	----	*	0x2212
F98.19	Output terminals state at previous fault	----	----	*	0x2213
F98.20	AC drive state at previous fault	----	----	*	0x2214
F98.21	Power-on time at previous fault	----	----	*	0x2215
F98.22	Running time at previous fault	----	----	*	0x2216
F98.23	Running frequency at previous 2 fault	----	----	*	0x2217
F98.24	Output current at previous 2 fault	----	----	*	0x2218
F98.25	Output voltage at previous 2 fault	----	----	*	0x2219
F98.26	Bus voltage at previous 2 fault	----	----	*	0x221A
F98.27	IGBT temperature at previous 2 fault	----	----	*	0x221B
F98.28	Input terminals state at previous 2 fault	----	----	*	0x221C
F98.29	Output terminals state at previous 2 fault	----	----	*	0x221D
F98.30	AC drive state at previous 2 fault	----	----	*	0x221E
F98.31	Power-on time at previous 2 fault	----	----	*	0x221F
F98.32	Running time at previous 2 fault	----	----	*	0x2220

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
Group F99 Monitoring Function Group					
F99.00	Output frequency	0.00Hz~F01.08(Upper limit Freq)	----	*	0x2100
F99.01	Setting frequency	0.00Hz~F01.08(Upper limit Freq)	----	*	0x2101
F99.02	Output current	0.01~5000.0A	----	*	0x2102
F99.03	Motor speed	0~65535rpm	----	*	0x2103
F99.04	Load speed display	0~65535	----	*	0x2104
F99.05	Output power	0.1~6553.5KW	----	*	0x2105
F99.06	Output torque	-300.0%~300.0%	----	*	0x2106
F99.07	Output voltage	0~1000V	----	*	0x2107
F99.08	DC bus voltage	0.0~2000.0V	----	*	0x2108
F99.09	AC input voltage	0.0~2000.0V	----	*	0x2109
F99.10	AC drive status	1: Forward 2: Reverse 3: Forward Jogging 4: Reverse Jogging 5: AC drive Fault 6: Under-voltage 7: AC drive stop	----	*	0x210A
F99.11	Fault information	0~33(Corresponding to F98.00)	----	*	0x210B
F99.12	AI1 input voltage	0.00~10.00V	----	*	0x210C
F99.13	AI2 input voltage	0.00~10.00V	----	*	0x210D
F99.14	AI3 input voltage	0.00~10.00V	----	*	0x210E
F99.15	AO1 output voltage	0.00~10.00V	----	*	0x210F
F99.16	AO2 output voltage	0.00~10.00V	----	*	0x2110
F99.17	DI state	0x00~0xFFF	----	*	0x2111
F99.18	DI state display	The state of each function end is indicated by the on-off of the specified section of the LED digital tube. The on-off of the digital tube segment means that the corresponding terminal state is valid, while the off-off means that the corresponding terminal state is invalid. 	----	*	0x2112

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F99.19	DO state	0x00~0xFFF	----	*	0x2113
F99.20	DO state display	Same as F99. 18. 	----	*	0x2114
F99.21	Di5 pulse frequency	0.01~100.00kHz	----	*	0x2115
F99.22	HDO output frequency	0.01~100.00kHz	----	*	0x2116
F99.23	PID reference	0~65000	----	*	0x2117
F99.24	PID feedback	0~65000	----	*	0x2118
F99.25	Counting value	0~65535	----	*	0x2119
F99.26	Length value	0~65535	----	*	0x211A
F99.27	Linear speed	0~65535	----	*	0x211B
F99.28	Target torque	-300.0%~300.0%	----	*	0x211C
F99.29	Remaining running time	0.1Min~6553.5Min	----	*	0x211D
F99.30	PLC step	0~15	----	*	0x211E
F99.31	Feedback frequency	0. 01Hz~F01. 07(MAX. Freq)	----	*	0x211F
F99.32	Feedback speed of encode	0. 01Hz~F01. 07(MAX. Freq)	----	*	0x2120
F99.33	Motor temperature	1~200°C	----	*	0x2121
F99.34	AC drive temperature	-30~200°C	----	*	0x2122
F99.35	Current Power-on time	1Min~65535Min	----	*	0x2123
F99.36	Current Running time	0.1Min~6553.5Min	----	*	0x2124
F99.37	G/P type	0: G type 1: P type	----	*	0x2125
F99.38	AC drive power	0.7~500.0KW	----	*	0x2126
F99.39	Motor seletion	1: Motor 1 2: Motor 2	----	*	0x2127
F99.40	Accumulative power-on time	1Min~65535Min	----	*	0x2128
F99.41	Accumulative running time	0.1Min~6553.5Min	----	*	0x2129

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
System Function Group

Function code	Name	Setup range	Default Value	Modification	Add.
F00.00	Motor selection	0~1	0	X	0x000

0: Motor 1

Select motor 1 for current load.Please set the parameters of motor 1 in F05 function codes.

1: Motor 2

Select motor 2 for current load.Please set the parameters of motor 2 in F07 function code.

You can select the desired motor parameter group in F00. 00 or via a DI terminal.If any of F11.00 to F11.09 is set for function 41 “Motor selection”, DI terminal overrides F00.00. If none of F11.00 to F11.09 is set for function 41 “Motor selection”, motor selection is determined by F00.00

Function code	Name	Setup range	Default Value	Modification	Add.
F00.01	Motor control technique	00~11	00	X	0x001

Ones: motor 1 control technique

0: V/f control

Constant Volt/Hertz ratio control: Applicable to such cases in which the performance requirement to the drive is not rigorous, or using one drive to drive several motors, or it is difficult to identify motor parameters correctly, etc. When motor 1 under V/f control is selected, need to set related parameters group F04 well;

1: Sensor-less vector control

This helps achieve high-performance control without encoder.Sensor-less vector control is precise vector control and it requires motor rotary tune.Before the first operation, the motor parameters should be self-learned to obtain the correct motor parameters;

2: Closed-loop vector control

Closed-loop vector control and realize high-precise speed control, torque control, torque constraint, and simple servo drive functions, etc. When this control pattern is selected, please install PG (optical-electricity encoder or rotating transformer). Before the first operation, the motor parameters should be self-learned to obtain the correct motor parameters;

Tens: motor 2 control technique

Please refer to Ones.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.02	Type of drive	0~1	0	X	0x002

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

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

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.03	LCD display language	0~2	0	○	0x003

0:Chinese

1:English

2:Russian

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.05	Parameters copy	0~4	0	○	0x005

0: No operation
1: Displays the modified parameters
2: Parameters copied to control panel
3: Parameters copied(excluding motor parameters)to control board
4: Parameters copied(including motor parameters)to control board

CODE	Fault
EC1	Failed to read control board parameters
EC2	Failed to write control board parameters
EC3	Keyboard EEP read/write error
EC4	Keyboard EEP read/write error
EC5	The keyboard is stored empty
EC6	Software version error

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.06	Parameters protection	0~1	0	○	0x006

0: All parameter programming allowed

1: Only this parameter programming allowed

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.07	Software version	XXXXX		*	0x007

This parameter shows the version of the software

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.08	User's password	0: No password Other: Password protection	0	8	0x008

The AC drive provides a security protection function that requires a user-defined password.

Function parameter F00.08 controls this function.

When F00.08 has the default value zero, it is not necessary to enter a password to program the AC drive.

Note: Restoring the factory default value(F00.10) will clear the user password, please use with caution.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.09	Supplier's password	XXXXX	Model de-pendent	○	0x009

Non-user parameters

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F00.10	Parameter restoration	0~3	0	X	0x00A

0: No operation
1: Restore all parameters to factory default (excluding motor parameters)
2: Clear fault record
3: Restore all parameters to factory default (including motor parameters)

Note: The function code will automatically revert to 0 after the operation is completed;The initialization operation can clear the user password. Please use this function with caution.

Group F01
Basic Function Group

Function code	Name	Setup range	Default Value	Modification	Add.
F01.00	X frequency command	0~9	1	X	0x100
F01.01	Y frequency command		3	X	0x101

1: Digital setting

When the drive is powered up, the value of F01.05 is taken as the master frequency reference.

The user can modify the set value through UP and DOWN of the keyboard and terminal. no matter the drive is running or in stop.

Frequency adjustment via / on control panel and Frequency adjustment via terminal UP and DOWN can be cleared through terminal "Clear UP/DOWN(including key) adjustment". Refer to F11.00~FF11.09 tor details.

1: Panel potentiometer

The setting frequency is set by the potentiometer knob on the keyboard. The user can adjust the frequency setting value by operating the potentiometer knob.

Note: This frequency source only supports LED keyboard. LCD keyboard has no keyboard potentiometer.

2:AI1

3:AI2

4:AI3

The set frequency is determined by the analog input terminal. The analog input of AC drive is composed of 2 road signs and analog input terminals AI1, AI2 and one way extended analog input terminals AI3. The three analog input channels are all optional voltage/current input (0~10V/0~20mA), and the voltage or current input can be selected through the skip line.

Refer to specification of F14.00~F14.27 for corresponding relation between analog input and output frequency.

See parameter Group F16 for automatic correction of analog input.

5: High-speed pulse DI5 input

If this parameter value selected, frequency reference will be determined by pulse frequency input via terminal DI5 only. In such a case, F11.04 should be set to 28. Corresponding relation between pulse frequency and frequency reference is specified in F14.28~F14.32.The 100.0% set for high-speed pulse input corresponds to the maximum forward output frequency (F01.07), and the -100.0% corresponds to the maximum reverse output frequency (F01.07).

6: Multi-step Freq running

To select multi-speed operation mode, F11 sets of multi-function input terminals are required to define multi-speed terminals and F21 sets of multi-speed parameters to determine the correspondence between the given signal and the set frequency.

7: Simple PLC

To select a simple PLC operation mode, it is necessary to set F21 multi-stage speed and PLC parameters to determine the set frequency, running direction and running time.

8: PID control

When choosing PID control, it is necessary to set Group F19 PID function parameters, and the operating frequency of the converter is the frequency value after PID action.The meaning of PID given source, quantitative, feedback source, etc., please refer to the introduction of Group F19 PID function.

9: Communication

The host computer/device is the master frequency reference source of the drive through standard RS485 communication interface on the drive.

Refer to Group F18 and appendix on this manual for further information about communication protocol, and programming, etc

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.02	Y frequency command reference	0~1	0	○	0x102

0: Maximum output frequency,

100% of Y frequency setting corresponds to the maximum output frequency F01.07.

1: X frequency command,

100% of Y frequency setting corresponds to the X frequency.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.03	Y frequency range	0.0~100.0%	100.0%	○	0x103

This parameter is the gain coefficient of the source Y frequency running results.Y frequency source = Y frequency source command (percentage) × Y frequency command reference object×Y frequency source gain coefficient when the user selects Y 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	Modifi-cation	Add.
F01.04	Combination of the setting codes	00~34	00	○	0x104

Ones: Frequency reference selection
0: X
1: X and Y calculation (based on tens position)
2: Switchover between X and Y
3: Switchover between X and "X&Y calculation”
4: Switchover between Y and "X&Y calculation”

Tens: X and Y calculation formula
0: X + Y
1: X - Y
2: Max. (X, Y)
3: Min. (X, Y)

The switching function of frequency source is realized by Group F11 input function "frequency source switching" terminal.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.05	Keypad digital setting frequency	0.00Hz~F01.07(Max. Freq)	50.00Hz	○	0x105

When X and Y frequency commands are selected as "keypad Digital 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	Modifi-cation	Add.
F01.06	Retentive of digital setting frequency	00~11		8	0x106

Ones: Retentive selection of digital setting frequency upon stop.

After set F01.05, it determines whether to save frequency reference selection by the up/down function of keypad or terminal when the AC drive stops.
0: Not retentive
1: Retentive

Tens:
Retentive selection of digital setting frequency upon power-off.

After set F01.05,it determines whether to save frequency reference selection by the up/down function of keypad or terminal when the AC drive power-off.

0: Not retentive
1: Retentive

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.07	Max. output frequency	50.00Hz~500.00Hz	50.00Hz	×	0x107

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	Modifi-cation	Add.
F01.08	Upper limit frequency source selection	0~4	0	○	0x108

The parameter defines the source of the upper bound frequency.The upper frequency may come from a digital setting (F01.09), an analog input channel, or a given pulse.When timing with analog quantities or pulses, the maximum frequency set to 100% corresponds to F01.07.

0: F01.09
1: AI1
2: AI2
3: AI3
4: Pluse DI5

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.09	Upper limit frequency	F01.10~F01.07(Max. frequency)	50.00Hz	○	0x109

When F01.08 is set to 0, the parameter determines the upper limit frequency.

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	Modifi-cation	Add.
F01.10	Lower limit frequency	0.00Hz~F01.09 (Upper limit frequency)	0.00Hz	○	0x10A

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 F01.13

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

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.11	Jog frequency	0.00Hz~F01.07(Max. frequency)	5.00Hz	○	0x10B

The set frequency of jog

The acceleration time of inching is set by F03.08,

The deceleration time of inching is set by F03.09.

The jog command can be controlled by operating panel S key, control terminal or communication.Multifunction S key can be set as forward jog or reverse jog key through parameter F10.00.Jog can be realized using "forward jog terminal" and "reverse jog terminal" of DI, as well as via communication input. See drive communication protocol for further information.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.12	Jog selection in running state	0:allowed 1:prohibited	0	○	0x10C

This parameter determines whether the JOG command is valid in the operating state of the AC drive

0:allowed
1:prohibited

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.13	Action if running frequency<lower limit frequency	0~2	0	○	0x10D
F01.14	Time-delay of stop when running frequency<lower limit frequency	0.0s~6500.0s	0.0s	○	0x10E

0: Run at lower limit frequency

the run should be at lower limit frequency.

1: Run at 0Hz

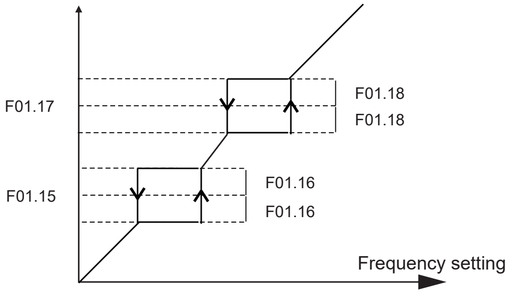
the run should be at 0Hz.

2: Stop

stop would be activated after the time delay set by F01.14. When lower limit frequency is 0, this limitation is invalid.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F01.15	Jump frequency 1	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x10F
F01.16	Jump frequency 1 width	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x110
F01.17	Jump frequency 2	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x111
F01.18	Jump frequency 2 width	0.00Hz~F01.07(Max. frequency)	0.00Hz	○	0x112

Skip frequency is a function designed to prevent the drive run at resonance zone of mechanical system. At most 2 skip zones can be defined. See Fig.



Once parameters of skip zones are set, the output frequency of the drive would automatically get out of these skip zones even if the frequency reference is within these zones.

NOTE:

Output frequency of drive can normally pass through skip zones during Accel and Decel.

Group F02
Startup and stop Control

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F02.00	Run command channel	0~4	0	○	0x200

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)

Control run command through RUN, STOP/RESET and MF keys on control panel (set multifunction key s to JOG by F10.00). Refer to Chapter 4 about the operation of control keypad

1: Terminal running command channel(“LOCAL/REMOT” LED is ON)

Control run command via DI terminals. Perform FORWARD and REVERSE by DI terminals. The Keypad STOP invalid.

2: Terminal running command channel(“LOCAL/REMOT” LED is ON)

Control run command via DI terminals. Perform FORWARD and REVERSE by DI terminals. The Keypad STOP invalid. The Keypad STOP valid.

3: Communication run command channel(“LOCAL/REMOT” LED is FLASH)

Master device is able to control run command through built-in RS485 serial communication interface of drive.The Keypad STOP invalid.

4: Communication running command channel(“LOCAL/REMOT” LED is FLASH)

Master device is able to control run command through built-in RS485 serial communication interface of drive.The Keypad STOP valid.

Run command from control panel, terminals and communication can be switched by terminals"run command switched to control panel control", "run command switched to terminal control" and "run command switched to communication control".

Multifunction key S can be set to "run command sources shifted" key through parameter F10.00. When S key is pressed under this setting, run command will be shifted during control panel control, terminal control and communication control circularly.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F02.01	Binding command source to frequency source	000~AAA	000	○	0x201

This parameter defines the bundled combination of three run command sources and frequency reference sources with the purpose of facilitating simultaneous switching.

Refer to parameter F01.00 for details regarding above-mentioned sources of frequency reference.

Different run command sources can be bundled with the same frequency reference source.

The priority of frequency reference sources bundled with run command overrides F01.00~F01.05.

Ones:Binding keyboard command to frequency source
0: No function
1: Keypad digital setting
2: Keypad potentiometer setting
3: Analog AI1 setting
4: Analog AI2 setting
5: Analog AI3 setting
6: High-speed pulse DI5 setting
7: Multi-speed running setting
8: Simple PLC program setting
9: PID control setting
A: Communication setting

Tens: Binding terminal command to frequency source

0–9, same as Ones

Hundreds:Binding communication command to frequency source

0–9, same as Ones

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F02-02	Rotation direction	0~1	0	○	0x202

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

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

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	Modifi-cation	Add.
F02.03	Start-up mode	0~2	0	○	0x203

This parameter takes effect during the process of transition from stop status to run status.

0: From start frequency

When drive starts to run from stop status, it starts from start frequency F02.04 and keeps this frequency for a period of time set by F02.05, and then accelerated to frequency reference in accordance with the Accel method and time.

1: 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, like rotating fan, etc.

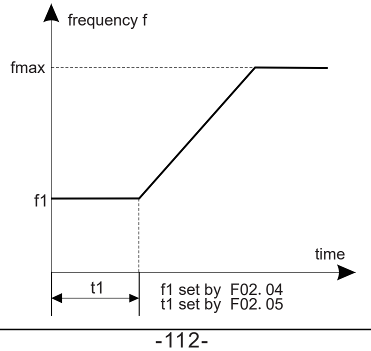
2: DC braking/Pre excitation start

To make the motor stop completely, the drive will perform DC braking with a certain period of time, as specified by F02.06, F02.07, then start from start frequency F02.04, keeping a period of time as specified by F02.05, and then accelerate to frequency reference.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F02.04	Starting frequency of direct start	0.00~10.00Hz	0.00Hz	×	0x204
F02.05	Retention time of the starting frequency	0.0~100.0s	0.0s	×	0x205

Start frequency is initial output frequency of drive start from stop status. Start frequency holding time is the continuous run time with start frequency. After this holding time, the drive will accelerate to set frequency. Usually appropriate start frequency and holding time assure the starting torque of heavy-duty load.

Provided that set frequency is lower than start frequency, drive output frequency is 0 Hz. Start frequency and start frequency holding time take effect at the moment of motor start, as well as the transfer between forward and reverse. Accel time excludes the holding time of start frequency.



Function code	Name	Setup range	Default Value	Modification	Add.
F02.06	DC injection braking level/ Pre excitation level	0.0~100.0%	50.0%	×	0x206
F02.07	DC injection braking active time/ Pre-excitation active time	0.0~1000.0s	0.0s	×	0x207

The AC drive will carry out DC injection braking level/Pre excitation level set before starting and it will speed up after the DC injection braking active time/Pre-excitation active time. If the time is set to 0, the DC injection braking/Pre excitation is invalid.

The stronger the braking current, the bigger of the braking power. The DC injection braking level/Pre excitation level before starting means the percentage of the rated current of the AC drive.

Function code	Name	Setup range	Default Value	Modification	Add.
F02.09	Stop Mode	0: Decelerate to stop 1: Coast to stop	0	○	0x209

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	Add.
F02.10	Starting frequency of DC braking	0.00~F01.07(Max. frequency)	0.00Hz	○	0x20A
F02.11	Waiting time of DC braking	0.0~1000.0s	0.0s	○	0x20B
F02.12	Stopping DC braking current	0.0~100.0%	50.0%	○	0x20C
F02.13	Stopping DC braking time	0.0~1000.0s	0.0s	○	0x20D

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	Add.
F02.14	Reverse disabled	0~1	0	○	0x20E

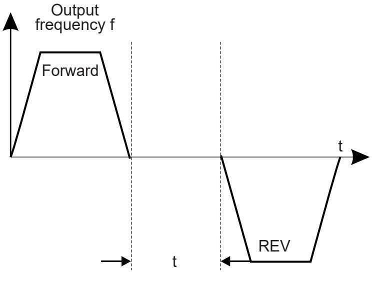
0: Reverse enabled

1: Reverse disabled

In some applications, reverse is likely to result in equipment damage. This parameter is used to prevent reverse running.

Function code	Name	Setup range	Default Value	Modification	Add.
F02.15	Dead time of FWD/REV rotation	0.0~3000.0s	0.0s	○	0x20F

The dead time with 0Hz output during the transition from forward to reverse, or from reverse to forward is indicated by letter "t" in Fig



Function code	Name	Setup range	Default Value	Modification	Add.
F02.16	The protection of the terminals command	0~1	0	○	0x210

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	Modifi-cation	Add.
F02.17	Select restart after power failure	0~1	0	○	0x211

Defines the drive status when power up again after power loss during running

0: Disabled

The drive will not run automatically when power is up after power loss.

1: Enabled.

When run command is controlled by control panel, the drive will run automatically when power is up again after power loss. When run command is controlled by terminals, the drive will run automatically only if ON signal from run command terminal is detected

NOTE:

Enable this parameter with caution for safety consideration.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F02.19	Energy braking seclection	0~1	1	○	0x213

0: Disabled

1: Enabled

When dynamic brake is enabled, the electric energy generated during Decel shall be converted into heat energy consumed by braking resistor, so as to attain rapid Decel. This brake method applies to brake of high-inertia load or the situations that require quick stop. In such a case, it is necessary to select appropriate dynamic braking resistor and brake chopper. The drives equal and below 30kW are provided with a standard inbuilt brake chopper. Inbuilt brake chopper is optional for drives 37kW~75kW.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F02.20	Energy braking threshold voltage	600.0~800.0V	700V	○	0x214
F02.21	Brake use ratio	0.0%~100.0%	100.0%	○	0x215

Two parameters takes effect only to the drives with inbuilt brake chopper. If F02.19 is set to 1, when bus voltage of drive attains the value of F02.20, Energy brake shall perform. The energy shall be rapidly consumed through braking resistor. This value is used to regulate the brake effect of brake chopper.

F02.21 is used to adjust the duty ratio of the dynamic braking unit. The higher the value is, the higher the duty ratio of the braking unit is and the stronger the braking effect is. However, the voltage of the inverter bus during the braking process fluctuates greatly.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F02.22	The coefficient of Magnetic flux braking	1~100%: The bigger the coefficient, the stronger the braking is)	0.0%	○	0x216

When overexcitation brake is enabled in case of stop by Decel, the motor shall transform the electric energy generated during Decel into heat energy by increasing magnetic flux so as to attain rapid stop. If this parameter is enabled, the Decel time will be shortened. If over excitation brake is disabled, the Decel current of motor will decrease and the Decel time will be lengthened.

Note: the current version of the flux brake is only valid for VF control.

Group F03
Acc/Dec Parameters

Function code	Name	Setup range	Default Value	Modification	Add.
F03.00	Acc-time 1	0.0~6500.0s	Model dependent	○	0x300
F03.01	Dec-time 1	0.0~6500.0s	Model dependent	○	0x301
F03.02	ACC time2	0.0~6500.0s	Model dependent	○	0x302
F03.03	DEC time2	0.0~6500.0s	Model dependent	○	0x303
F03.04	ACC time3	0.0~6500.0s	Model dependent	○	0x304
F03.05	DEC time3	0.0~6500.0s	Model dependent	○	0x305
F03.06	ACC time4	0.0~6500.0s	Model dependent	○	0x306
F03.07	DEC time4	0.0~6500.0s	Model dependent	○	0x307

Accel time means required time for drive to Accelerate to maximum frequency F01.07 from 0HZ frequency;

Dccel time means required time for drive to Decelerate to 0HZ frequency from maximum frequency F01.07 ;

These four types of Accel/Decel time can be selected through the ON/OFF combination of DI terminals "Accel/Decel time determinant 1" and "Accel/Decel time determinant 2". See Table.

Terminal 2	Terminal 1	Dec/Acc time selection	Correspondence parameters
OFF	OFF	Dec and Acc time 1	F03.00/F03.01
OFF	ON	Dec and Acc time 2	F03.02/F03.03
ON	OFF	Dec and Acc time 3	F03.04/F03.05
ON	ON	Dec and Acc time 4	F03.06/F03.07

NOTE:

When the drive is running under simple PLC, the Accel time and Decel time are determined by simple PLC related parameters, not by the DI terminals. See Group F21 for details.

When Accel/Decel of broken-line style is selected, Accel/Decel time is automatically switched to Accel/Decel time 1 and 2 according to switching frequency (F03.10,F03.11). Under this circumstance, Accel/Decel time selection terminals are disabled.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F03.08	Jogging ACC time	0.0~6500.0s	20.0s	○	0x308
F03.09	Jogging DEC time	0.0~6500.0s	20.0s	○	0x309

Accel time means required time for drive to Accelerate to maximum frequency F01.07 from 0HZ frequency;

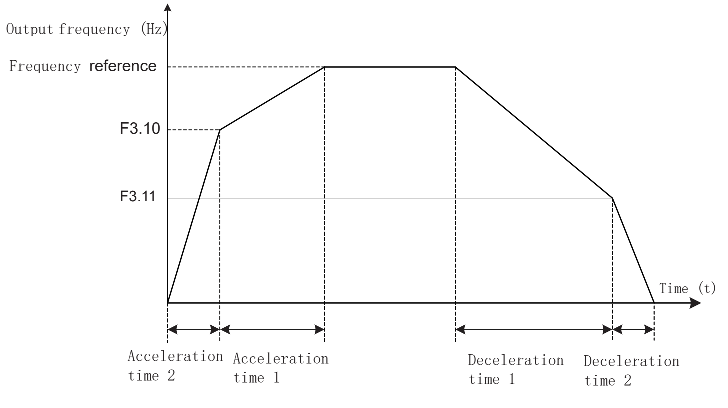
Dccel time means required time for drive to Decelerate to 0HZ frequency from maximum frequency F01.07 ;

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F03.10	Switching frequency of ACC time 1, 2	0.00~F01.07(Max. frequency)	0.00Hz	○	0x30A
F03.11	Switching frequency of DEC time 1, 2	0.00~F01.07(Max. frequency)	0.00Hz	○	0x30B

This function selects acceleration/deceleration time according to running frequency range during drive running. This function is active only when motor 1 is selected and acceleration/ deceleration time is not switched over via external DI terminal.

During acceleration, if the running frequency is below F3.10, acceleration time 2 is selected. If it is above F3.10, acceleration time 1 is selected.

During deceleration, if the running frequency is above F3.11, deceleration time 1 is selected. If it is below F3.11, deceleration time 2 is selected



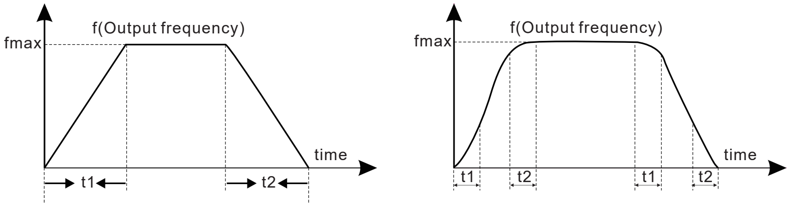
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F03.12	ACC/DEC selection	0~1	0	×	0x30C
F03.13	S curve start ratio	0.0~(100.0~F03.14)%	30.0%	×	0x30D
F03.14	S curve end ratio	0.0~(100.0~F03.13)%	30.0%	×	0x30E

F3.12 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.

Group F04
V/F Control Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F04.00	Motor 1V / F curve setting	0~3	0	X	0x400
F04.01	V/F frequency 1 of motor 1	0.00Hz~F04.03	0.00Hz	X	0x401
F04.02	V/F Voltage 1 of motor 1	0.0%~100.0%(motor1 rated voltage)	0.0%	X	0x402
F04.03	V/F frequency 2 of motor 1	F04.01~F04.05	25.00Hz	X	0x403
F04.04	V/F Voltage 2 of motor 1	0.0%~100.0%(motor1 rated voltage)	50.0%	X	0x404
F04.05	V/F frequency 3 of motor 1	F04.03~F02.02 (motor1 rated frequency)	50.00Hz	X	0x405
F04.06	V/F Voltage 3 of motor 1	0.0%~100.0%(motor1 rated voltage)	100.0%	X	0x406

Set the relation between output voltage and output frequency of the drive when motor 1 is under V/f control.

0: Straight line V/F curve

Applies to general constant-torque load. When drive output frequency is 0, output voltage will be 0, while when output frequency is rated frequency of motor, the output voltage would be rated voltage of motor.

1: Multi-dots V/F curve (determined by F04.01~F04.06)

Applies to spin drier, centrifuge, industrial washing machine and other special loads. When drive output frequency is 0, output voltage will be 0, while when output frequency is rated frequency of motor, the output voltage would be rated voltage of motor. What is different is this pattern can set 4 inflection points by F04.01~F04.06. See below Fig.

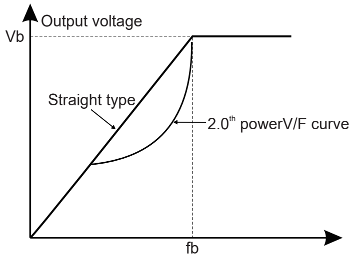
2: 2.0en power V/F curve

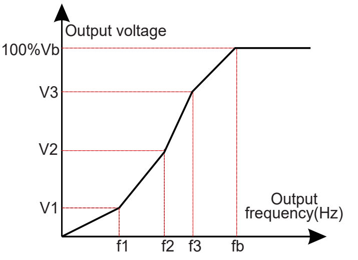
it apply to torque-dropped loads such as fans and water pumps. See Fig.

3: V/F separation

Output frequency and output voltage can be set separately. Frequency is set by the method as stated In Group F01. Output voltage Is set by F04.22. See F04.22 for details. This mode applies to variable-frequency power supply or torque motor control etc.

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.



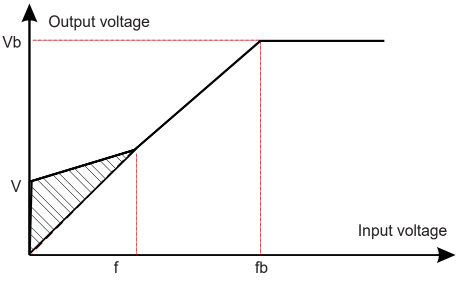


Function code	Name	Setup range	Default Value	Modification	Add.
F04.07	Torque boost of motor 1	0.0%(automatic torque boost) 0.1%~30.0%(Manual torque boost)	Model dependent	○	0x407
F04.08	Frequency limit of torque boost of motor1	0.00~F01.07(Max. frequency)	50.00Hz	X	0x408

Torque boost to the output voltage for the features of low frequency torque. F04.07 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.

F04.08 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	Add.
F04.09	V/F oscillation suppression gain of motor 1	0~100	Model dependent	○	0x409

Under V/f control, speed and current oscillation is likely to occur due to load vibration, and may lead to system failure even over current protection. This is particularly obvious during no-load or light-load applications. The appropriate setting of parameter values of F04.09 would effectively suppress speed and current oscillation. In many case it is not necessary to modify the default setting. Please make progressive change around default setting, since excessive setting will influence V/f control performance.

Function code	Name	Setup range	Default Value	Modification	Add.
F04.17	Torque boost of motor 2	0.0%(automatic torque boost) 0.1%~30.0%(Manual torque boost)	Model dependent	○	0x411
F04.18	Frequency limit of torque boost of motor2	0.00~F01.07(Max. frequency)	50.00Hz	X	0x412
F04.19	V/F oscillation suppression gain of motor2	0~100	Model dependent	○	0x413

Please refer to F04.07~F04.09

Function code	Name	Setup range	Default Value	Modification	Add.
F04.20	V/F slip compensation gain	0.0~200.0%	100%	○	0x414

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:

$$f = fb - n \times p/60$$

Note: fb is the rated frequency of the motor, its function code is F05.04. n is the rated rotating speed of the motor and its function code is F05.05. p is the pole pair of the motor. 100% corresponds to the rated slip frequency f.

Function code	Name	Setup range	Default Value	Modification	Add.
F04.21	Droop control	0.0~100.0%	0.0%	○	0x415

In case several drives drive one load, different drives may bear different proportion of the load.Through the setting of this parameter, the uniform load distribution on these drives could be attained.

The drive takes real-time detection of its load. Output frequency is automatically dropped according to the load and this parameter value, reducing itself borne load proportion.

Parameter value of F04.21 corresponds to drop frequency with rated load.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F04.22	Voltage setting on V/F separated pattern	0~9	0	○	0x416
F04.23	Keypad setting voltage	0.0~Motor rated voltage	0.0v	○	0x417
F04.24	Voltage ACC time	0.0~1000.0s	0.0s	○	0x418
F04.25	Voltage DEC time	0.0~1000.0s	0.0s	○	0x419

This parameter is valid when F4.00 is set to 3

0: Keypad digital setting(F04.23)
1: Keypad potentiometer setting
2: Analog AI1 setting
3: Analog AI2 setting
4: Analog AI3 setting
5: High-speed pulse DI5 setting
6: Multi-step Freq running setting
7: Simple PLC program setting
8: PID control setting
9: Communication setting

Voltage ACC time of V/F separation indicates time required by voltage to rise from 0 to rated motor voltage.

Voltage DEC time of V/F separation indicates time required by voltage to decline from rated motor voltage to 0.

Note:

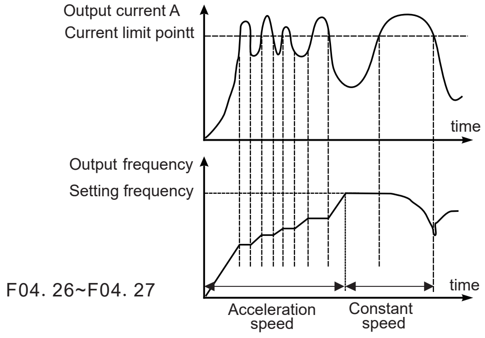
F04.22 100.0% of the set value corresponds to the rated voltage of the motor;

Please refer to the frequency source setting for details.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F04.26	Automatic current limit action selection	0: Disable 1: Enable	1	X	0x41A
F04.27	Automatic current limit	50.0~200.0%	160%	X	0x41B

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 F04.27, 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.



Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F04.30	Over-voltage stall protection	0: Invalid 1: Stall protection mode 1 2: Stall protection mode 2	2	X	0x41E
F04.31	Voltage protection of over-voltage stall	650.0V~800.0V	720.0V	X	0x41F

F04.30 Set Over-voltage stall protection mode

0: Invalid

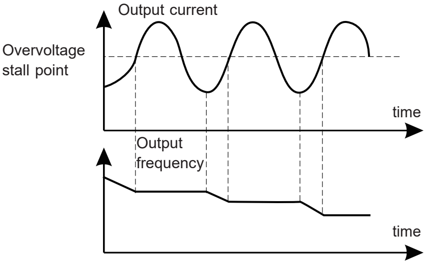
1: Stall protection mode 1

During the deceleration process of the AC drive, when the DC bus voltage exceeds the over-voltage stall protection voltage, the AC drive will gradually slow down the frequency drop with the voltage until the frequency drop stops and remains at the current operating frequency. After the bus voltage drops, the converter will continue to slow down.

2: Stall protection mode 2

During the operation of the AC drive, when the DC bus voltage exceeds the over-voltage stall protection voltage (F04.31), the AC drive will automatically pull up the frequency in reverse to consume the feedback voltage of the power generation state during the deceleration process. When the voltage drops below the stall protection voltage, the frequency will automatically return to the normal state to continue operation.

Set overpressure stall protection point on F04.31



Group F05
Motor 1 Parameter Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F05.00	Motor 1 type	0~1	0	×	0x500

0: Ordinary asynchronous motor
1: AC drive motor

The major difference between ordinary motor and variable frequency motor lies in the handling of motor overload protection. Under low speed run, ordinary motor has poor heat dissipation,so motor overload protection shall be derated at low speed. Since fan-based heat dissipation of variable frequency motor is not affected by motor speed, low-speed overload protection is not necessarily derated.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F05.01	Rated power of motor 1	0.1~1000.0kW	Model dependent	×	0x501
F05.02	Rated voltage of motor 1	0~1200V	Model dependent	×	0x502
F05.03	Rated current of motor 1	0.1~6000.0A	Model dependent	×	0x503
F05.04	Rated frequency of motor 1	0.01~F01.07(Max. frequency)	50.00Hz	×	0x504
F05.05	Rated speed of motor1	1~36000rpm	Model dependent	×	0x505

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 F05.01~F05.05 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. AC drive provides parameter auto-tuning function. Accurate parameter auto-tuning depends on proper setting of the motor nameplate parameters.

Note:Reset the motor rated power (F05.01), you can initialize F05. 02~F05. 10 motor parameters.

Function code	Name	Setup range	Default Value	Modification	Add.
F05.06	Stator resistance of motor 1	0.001~65.535Ω	Model dependent	×	0x506
F05.07	rotor resistance of motor 1	0.001~65.535Ω	Model dependent	×	0x507
F05.08	leakage inductance of motor 1	0.01~655.35mH	Model dependent	×	0x508
F05.09	Mutual inductance of motor 1	0.01~655.35mH	Model dependent	×	0x509
F05.10	Non-load current of motor 1	0.1A~F05.03	Model dependent	×	0x50A

F05.06 ~ F05.10 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 F05.06~F05.10 all the parameters, static auto-tuning only get 3 parameters of F05.06~F05.08 ,the other parameters remain the factory default value.

Function code	Name	Setup range	Default Value	Modification	Add.
F05.16	Encoder type	0~1	0	×	0x510

0 : ABZ incremental encoder

1 : Rotating transformer

The AC drive using closed-loop vector control motor need to be installed with encoder. AC drive currently supports two types encoder, and different encoder require different PG cards, please purchse the optional PG card correctly and set it properly according to the actual situation with the following function parameters to ensure the operation of the closed loop vector control.

Function code	Name	Setup range	Default Value	Modification	Add.
F05.17	Encoder pulses per revolution	1~65535	1024	×	0x511

When set each lap ABZ encoder output pulse number, users generally obtain each circle of output pulse number through the ABZ incremental encoder nameplate.

Function code	Name	Setup range	Default Value	Modification	Add.
F05.18	A/B phase sequence of ABZ incremental encoder	0: Forward 1: Reserve	0	×	0x512

0 : Forward

1 : Reverse

Setting the phase sequence of AB signal of the ABZ encoder, after the encoder and PG card was installed, asynchronous motor will automatically do self-learning and receive phase AB pulse sequence.

Note:If select V/F control or open loop control, automatically self-learning will receive AB pulse sequence.

Function code	Name	Setup range	Default Value	Modification	Add.
F05.19	Number of pole pairs of resolver	1~65535	1	×	0x513

When selecting the encoder type rotating transformer, this parameter is set rotating transformer of logarithm.

Function code	Name	Setup range	Default Value	Modification	Add.
F05.25	Encoder disconnection fault detection time	0:No detection 0.1s~10.0s	0.0	×	0x519

This parameter takes effect under closed-loop vector control. When the motor is running at none-zero speed, if the drive fails to detect input signals of phases A and B of the encoder in the span of time set by F05.25, the drive will treat abnormality happened to the PG. The drive reports fault "E.ECD" and coast to stop.

When this parameter is set to 0.0s, the detection is disabled.

Function code	Name	Setup range	Default Value	Modification	Add.
F05.26	Motor 1 parameter autotuning	0~2	0	×	0x51A

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.

Group F06:
Motor 1 Vector Control Parameters

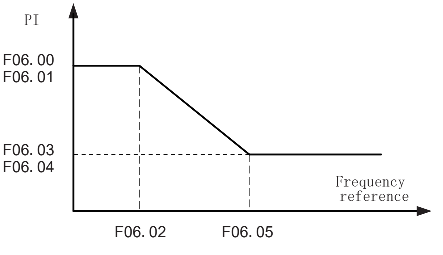
Function code	Name	Setup range	Default Value	Modifi–cation	Add.
F06.00	Speed loop proportional gain 1	1~100	30	○	0x600
F06.01	Speed loop integral time 1	0.01~10.000s	0.50s	○	0x601
F06.02	Low switching frequency	0.00Hz~F06.05	5.00Hz	○	0x602
F06.03	Speed loop proportional gain 2	1~100	20	○	0x603
F06.04	Speed loop integral time 2	0.01~10.00s	1.0s	○	0x604
F06.05	High switching frequency	F06.02~F01.07（Max. frequency）	10.00Hz	○	0x605

F06.00 to F06.05 are speed loop PI parameters.

If running frequency ≤ F06.02(Switchover frequency 1), PI parameters are F06.00 and F06.01.

If running frequency ≥ F06.05(Switchover frequency 2), PI parameters are F06.03 and F06.04.

If running frequency is between F06.02 and F06.05, PI parameters are obtained from linear switchover between two groups of PI parameters, as shown in Figure.



To improve the system response, increase the proportional gain or reduce the integral time. Remember to increase proportional gain first to ensure that the system does not oscillate, and then reduce integral time to ensure that the system has quick response and small overshoot.

NOTE:

Incorrect PI setting may cause large speed overshoots and a fast falling speed drop may cause an overvoltage on the DC bus.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.06	ASR feedback input filtering time	0.000~0.100s	0.015s	○	0x606

This parameter takes effect only when Motor control technique is FVC. You can improve motor stability by increasing F06.07. Be aware that this may slow dynamic response. Decreasing it will obtain quick system response but may lead to motor oscillation. Adjustment of this parameter is not required normally

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.07	Current loop percentage coefficient KP1	0~60000	Model de-pendent	○	0x607
F06.08	Current loop integral coefficient KI1	0~60000	Model de-pendent	○	0x608
F06.09	Current loop percentage coefficient KP2	0~60000	Model de-pendent	○	0x609
F06.10	Current loop integral coefficient KI2	0~60000	Model de-pendent	○	0x60A

These function parameters are vector control current loop PI parameters. They are obtained frommotor auto-tuning. Adjustment of these parameter is not required normally.

The dimension of current loop integral regulator is integral gain rather than integral time. Very large current loop PI gain may lead to control loop oscillation. When current oscillation or torque fluctuation is great, decrease the proportional gain or integral gain.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.11	Electric torque upper limit setting source selection	0~6	Model de-pendent	○	0x60B

In the speed control mode, there are 6 ways to set the upper limit source of electric torque, which can be selected by F06.11.

0: Keypad digital setting(F06.13)
1: Keypad potentiometer setting
2: Analog AI1 setting
3: Analog AI2 setting
4: Analog AI3 setting
5: High-speed pulse DI5 setting
6: Communication setting

Note: Full range of values 1~6 corresponds to the digital setting of F06.13.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.12	Braking torque upper limit setting source selection	0~6	Model dependent	○	0x60C

In the speed control mode, there are 6 ways to set the upper limit source of braking torque, which can be selected by F06.12.

0: Keypad digital setting(F06.14)
1: Keypad potentiometer setting
2: Analog AI1 setting
3: Analog AI2 setting
4: Analog AI3 setting
5: High-speed pulse DI5 setting
6: Communication setting
Note: Full range of values 1~6 corresponds to the digital setting of F06.14.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.13	Keypad digital setting of electric torque	0.0~200.0%（Motor rated current）	150.0%	○	0x60D
F06.14	Keypad digital setting of braking torque	0.0~200.0%（Motor rated current）	150.0%	○	0x60E

F06.11 is set as 0: when the upper torque limit is set digitally, the upper torque full range of the electric state is set as F06.13.

F06.12 is set as 0: when the upper limit of torque is set numerically, the upper full range of torque in power generation state is set as F06.14.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.15	Torque limit coefficient influx weakening	50~200	100	○	0x60F

Under the pattern of SVC or FVC speed control, and when the drive is running at frequency higher than rated frequency (flux weakening zone), appropriate torque limit coefficient can effectively improve the performance of output torque and Accel/Decel characteristics.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F06.16	Compensation coefficient of slip	50%~200%	100%	○	0x610

This function improves control performance in SVC/FVC .

For FVC , it can adjust output current of the AC drive. Decrease this parameter gradually when a large rating AC drive is controlling a lightly loaded motor. Adjustment of this parameter is not required normally.

Group F07
Motor 2 Parameter Group

When motor 2 is selected as current loaded motor, set motor parameters in Group F07. The specification of Group F07 of motor 2 is the same with that of Group F05 of motor 1.

Function code	Name	Setup range	Default Value	Modification	Add.
F07.00	Motor 2 type	0: Ordinary asynchronous motor (with low-frequency compensation) 1: AC drive motor (without low frequency compensation)	0	×	0x700
F07.01	Rated power of motor 2	0.1~1000.0kW	Model dependent	×	0x701
F07.02	Rated voltage of motor 2	0~1200V	Model dependent	×	0x702
F07.03	Rated current of motor 2	0.1~6000.0A	Model dependent	×	0x703
F07.04	Rated frequency of motor 2	0.01~F01.07(Max. frequency)	50.00Hz	×	0x704
F07.05	Rated speed of motor2	1~36000rpm	Model dependent	×	0x705
F07.06	Stator resistance of motor 2	0.001~65.535Ω	Model dependent	×	0x706
F07.07	Rotor resistance of motor 2	0.001~65.535Ω	Model dependent	×	0x707
F07.08	leakage inductance of motor 2	0.01~655.35mH	Model dependent	×	0x708
F07.09	Mutual inductance of motor 2	0.01~655.35mH	Model dependent	×	0x709
F07.10	Non-load current of motor 2	0.1A~F07.03	Model dependent	×	0x70A
F07.16	Encoder type	0: ABZ incremental encoder 1: Resolver	0	×	0x710
F07.17	Encoder pulses per revolution	1~65535	1024	×	0x711
F07.18	A/B phase sequence of ABZ incremental encoder	0: Forward 1: Reserve	0	×	0x712
F07.19	Number of pole pairs of resolver	1~65535	1	×	0x713
F07.25	Encoder disconnection fault detection time	0: No detection 0.1s~10.0s	0.0	×	0x719
F07.26	Motor 2 parameter autotuning	0: No operation 1: Rotation autotuning 2: Static autotuning	0	×	0x71A

Group F08:
Motor 2 Vector Control Parameters

When motor 2 is selected as current loaded motor under vector control, please set parameters in Group F08. The specification of vector control parameters Group F08 of motor 2 is the same with that of vector control parameters Group F06 of motor 1.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F08.00	Speed loop proportional gain 1	1~100	30	○	0x800
F08.01	Speed loop integral time 1	0.01~10.00s	0.50s	○	0x801
F08.02	Low switching frequency	0.00Hz~F08.05	5.00Hz	○	0x802
F08.03	Speed loop proportional gain 2	1~100	20	○	0x803
F08.04	Speed loop integral time 2	0.01~10.00s	1.0s	○	0x804
F08.05	High switching frequency	F08.02~F01.07（Max. frequency）	10.00Hz	○	0x805
F08.06	ASR feedback input filtering time	0.000~0.100s	0.015s	○	0x806
F08.07	Current loop percentage coefficient KP1	0~60000	Model dependent	○	0x807
F08.08	Current loop integral coefficient KI1	0~60000	Model dependent	○	0x808
F08.09	Current loop percentage coefficient KP2	0~60000	Model dependent	○	0x809
F08.10	Current loop integral coefficient KI2	0~60000	Model dependent	○	0x80A
F08.11	Electric torque upper limit setting source selection	0: Keypad digital setting(F08.13) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F08.13.	Model dependent	○	0x80B

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F08.12	Braking torque upper limit setting source selection	0: Keypad digital setting(F08.14) 1: Keypad potentiometer setting 2: Analog AI1 setting 3: Analog AI2 setting 4: Analog AI3 setting 5: High-speed pulse DI5 setting 6: Communication setting Note: Full range of values 1~6 corresponds to the digital setting of F08.14.	Model de-pendent	○	0x80C
F08.13	Keypad digital setting of electric torque	0.0~200.0%（Motor rated current）	150.0%	○	0x80D
F08.14	Keypad digital setting of braking torque	0.0~200.0%（Motor rated current）	150.0%	○	0x80E
F08.15	Torque limit coefficient influx weakening	50~200	100	○	0x80F
F08.16	Compensation coefficient of slip	50%~200%	100%	○	0x810

Group F09:
Torque Control Parameters

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.00	Speed/Torque control selection	0~1	0	X	0x900

This function parameter determines whether the AC drive is in speed control or torque control.

0: Speed control

1: Torque control

The AC drive has two digital input functions related to torque control, function 42 "Speed control/Torque control" and function 43 "Torque control prohibited" . The two functions must be used together with parameter F09.00 to implement switchover between speed control and torque control.

When function 42 is enabled, the control mode is determined by setting of F09.00.

When function 42 is disabled, the control mode is reverse to setting of F09.00.

When function 43 is enabled, the AC drive always run in speed control no matter whether function 42 is enabled or disabled.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.01	Torque setting source in torque control	0~6	0	○	0x901
F09.02	Torque digital setting in torque control	-200.0%~200.0%	150.0%	○	0x902

These two function parameters select channel of setting torque reference in torque control.

0: Keypad digital setting(F09.02)

1: Keypad potentiometer setting

2: Analog AI1 setting

3: Analog AI2 setting

4: Analog AI3 setting

5: High-speed pulse DI5 setting

6: Communication setting

Torque reference is a relative value. 100.0% corresponds to rated AC drive torque (can be viewed in F99.06). When torque reference is a positive value, the AC drive runs in forward direction. When torque reference is a negative value, the AC drive runs in reverse direction.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.03	ACC time in torque control	0.00~650.00s	0.00s	○	0x903
F09.04	DEC time in torque control	0.00~650.00s	0.00s	○	0x904

These function parameters set acceleration/deceleration time in torque control to implement smooth change of motor speed. This helps to prevent problems such as big noise or too large mechanical stress caused by quick change of motor speed.

But in applications where rapid torque response is required, for example, two motors are used to drive the same load, you need to set these two parameters to 0.00s.

For example, two motors drive the same load. To balance the load level of the two motors, set one drive as master in speed control and set the other as slave in torque control.

The slave will follow output torque of the master as its torque reference, which requires quick response to the master output torque. In this case, set acceleration/deceleration time of the slave in torque control to 0.00s.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.05	Torque control forward rotation upper limit frequency setting source selection	0~6	0	○	0x905
F09.06	Torque control forward rotation upper limit frequency keyboard limit value	0.00Hz~F01.07（Max. frequency）	50.0Hz	○	0x906

Under torque control, if the set torque is bigger than load torque, motor speed will increase continuously. To avoid over-run, maximum speed should be set to keep motor speed in limited range. This parameter sets the source for limiting the maximum speed of forward run.

0: Keypad digital setting(F09.06)

1: Keypad potentiometer setting

2: Analog AI1 setting

3: Analog AI2 setting

4: Analog AI3 setting

5: High-speed pulse DI5 setting

6: Communication setting

Note: Full range of values 1~6 corresponds to the digital setting of F09.06

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.07	Torque control reverse rotation upper limit frequency setting source selection	0~6	0	○	0x907
F09.08	Torque control reverse rotation upper limit frequency keyboard limit value	0.00Hz~F01.07（Max. frequency）	50.0Hz	○	0x908

Under torque control, if the set torque is bigger than load torque, motor speed will increase continuously. To avoid over-run, maximum speed should be set to keep motor speed in limited range. This parameter sets the source for limiting the maximum speed of reverse run.

0: Keypad digital setting(F09.08)

1: Keypad potentiometer setting

2: Analog AI1 setting

3: Analog AI2 setting

4: Analog AI3 setting

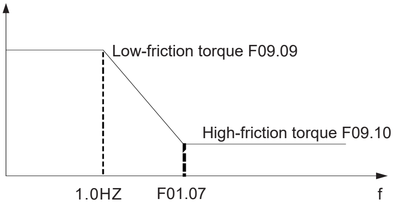
5: High-speed pulse DI5 setting

6: Communication setting

Note: Full range of values 1~6 corresponds to the digital setting of F09.08

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.09	Low-frictiontorque compensation	0.0~100.0%(motor rated torque)	0.0%	○	0x909
F09.10	High-frictiontorque compensation	0.0~100.0%(motor rated torque)	0.0%	○	0x90A

F09.09 use to set low frequency friction torque compensation amount. F09.10 use to high frequency friction torque compensation amount. .Between the low and high frequency, the friction torque is linearly proportional to the amount of compensation in F09.09 and F09.10.



Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F09.11	Coefficient of inertia compensation	0.0~100.0%(motor rated torque)	0.0%	○	0x90B

This parameter takes effect only in torque control. This parameter value is to compensate mechanical rotary inertia during acceleration/deceleration.

Group F10:
Keypad Operation and LED Display

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F10.00	The key of S function selection	0~6	1	×	0x0A00

0: No function

1: Forward jog, Press S key to begin the jogging FWD running.

2: Reverse jog, Press S key to begin the jogging REV running.

3: Forward/reverse switchover, Press S to shift the displayed function code from right to left.

4: Run command sources shifted,

when F02.00 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.

5: Clear the date of exact stop

Note:

When S key is used for forward/reverse switching (F10.00=3), the inverter will not remember the state after switching after power off.

When switching command channels using the S key (F10.00=4), if F02.00 is set to 0, the S key command source switch is invalid.When F02.00 is set to 1 or 2 (terminal), switch between terminal and operation panel can be achieved by S key.When F02.00 sets bit 3 or 4 (communication), the switch between communication and operation panel can be realized through S key.

When S key is used to clear the data during the accurate stop process (F10.00=5), it means that after pressing S key, the current count value, current length and current running time are all cleared 0.

Function code	Name	Setup range	Default Value	Modification	Add.
F10.01	Display parameter setting 1 on run status	0~65535	53	○	0x0A01

The F10.01 Parameter Setting Function Table

Parameters	DEC	Parameters	DEC
Running frequency (Hz ON)	2^0=1	Setting frequency (Hz flickering)	2^1=2
Bus voltage (V ON)	2^2=4	Output voltage (V ON)	2^3=8
Output current (A ON)	2^4=16	Motor speed(rpm ON)	2^5=32
Output power (% ON)	2^6=64	Output torque (% ON)	2^7=128
PID reference (% ON)	2^8=256	PID feedback (% ON)	2^9=512
DI terminal state	2^{10}=1024	DO terminal state	2^{11}=2048
AI1(V on)	2^{12}=4096	AI2(V on)	2^{13}=8192
AI3(V on)	2^{14}=16384	Linear speed	2^{15}=32768

When the converter is running, the specified parameters in F10.01 need to be displayed. It is only necessary to add the decimal corresponding to all display parameters and fill in F10.01

Function code	Name	Setup range	Default Value	Modification	Add.
F10.02	Display parameter setting 2 on run status	0~65535	0	○	0x0A02

The F10.02 Parameter Setting Function Table

Parameters	DEC	Parameters	DEC
PLC current segment number	2^0=1	Pulse count value	2^1=2
Length value	2^2=4	Torque setting value (% ON)	2^3=8
Pulse Di5 frequency	2^4=16	Load speed	2^5=32
IGBT temperature	2^6=64	AC input voltage	2^7=128
Encoder feedback speed	2^8=256	Reserve	

When the converter is running, the specified parameters in F10.02 need to be displayed. It is only necessary to add the decimal corresponding to all display parameters and fill in F10.02

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F10.04	Display parameter setting on stop status	0~65535	7	○	0x0A04

The F10.04 Parameter Setting Function Table

Parameters	DEC	Parameters	DEC
Setting frequency (Hz flickering)	2^0=1	Motor speed(rpm ON)	2^1=2
Bus voltage (V ON)	2^2=4	AC input voltage (V ON)	2^3=8
DI terminal state	2^4=16	DO terminal state	2^5=32
PID reference (% ON)	2^6=64	PID feedback (% ON)	2^7=128
AI1(V on)	2^8=256	AI2(V on)	2^9=512
AI3(V on)	2^{10}=1024	Length value	2^{11}=2048
Pulse count value	2^{12}=4096	PLC current segment number	2^{13}=8192
Load speed	2^{14}=16384	Pulse Di5 frequency	2^{15}=32768

When the converter is running, the specified parameters in F10.04 need to be displayed. It is only necessary to add the decimal corresponding to all display parameters and fill in F10.04

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F10.06	Auxiliary Monitoring	0~41	2	○	0x0A06

This parameter is used to set the parameters displayed in the digital tube under the control panel. The display parameters need to be consistent with the serial number of F99 groups of parameters

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F10.09	Load speed display coefficient	0.001~ 65. 000	1.000	○	0x0A09
F10.10	Number of decimal places for loadspeed display	0.Zero decimal point 1.One decimal point 2.Two decimal points 3.Three decimal points	0	○	0x0A0A

When the display of load speed is needed, the corresponding relationship between the output frequency of the AC drive and the load speed can be adjusted by F10.09, and the decimal number displayed in the load speed can be set by F10.10. With these two parameters, the user can match the display value of the load speed of the decimal point corresponding to the output frequency.

Group F11
Digital Input Terminal Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F11.00	DI1 terminals function selection	0: No function 1: Forward 2: Reverse 3: Three-wire control operation 4: Forward Jogging 5: Reverse Jogging 6: Coast to stop 7: External STOP terminal 1 8: External STOP terminal 2(DEC time4) 9: Immediate DC injection braking 10: DEC DC injection braking 11: Run Pause 12: Fault reset 13: Shift the command 1 14: Shift the command 2 15: Shift frequency command 16: Terminal UP 17: Terminal DOWN 18: Clear UP/DOWN (including∧/∨ key) adjustment 19: Multi-step speed terminal 1 20: Multi-step speed terminal 2 21: Multi-step speed terminal 3 22: Multi-step speed terminal 4 23: PLC status reset 24: PID parameters switching 25: PID second digital given switching terminal 26: PID action direction reverse 27: PID pause 28: Pulse input (valid only for DI5) 29: Swing pause 30: Counter input 31: Counter reset 32: Length count input 33: Length reset 34: Clear the current running time 35: Reverse prohibited 36: DEC/ACC time 1 37: DEC/ACC time 2 38: DEC/ACC disabling 39: External fault input 1 40: External fault input 2 41: Motor 1/2 switchover 42: Speed control/Torque control switchover 43: Torque control prohibited	1	×	0x0B00
F11.01	DI2 terminals function selection		2	×	0x0B01
F11.02	DI3 terminals function selection		4	×	0x0B02
F11.03	DI4 terminals function selection		12	×	0x0B03
F11.04	DI5 terminals function selection		0	×	0x0B04
F11.05	DI6 terminals function selection		0	×	0x0B05
F11.06	DI7 terminals function selection (extension card function)		0	×	0x0B06
F11.07	DI8 terminals function selection (extension card function)		0	×	0x0B07
F11.08	DI9 terminals function selection (extension card function)		0	×	0x0B08
F11.09	DI10 terminals function selection (extension card function)		0	×	0x0B09

Terminal Function Explained in Details

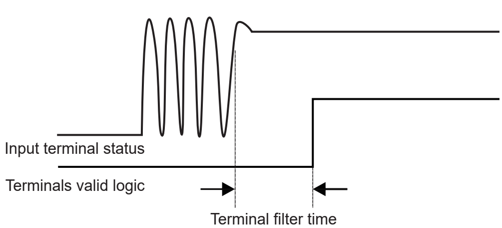
Setting Value	Function	Instruction
0	No function	Even if there is a signal input, the AC drive remain the same. Unused terminal was set to NO Function to prevent the wrong action.
1	Forward rotation operation	Through the external terminal to control the AC drive forward and reverse running.
2	Reverse rotation operation	
3	3-wire control operation	There are two-wire control and three-wire control about Forward (FWD) and reverse (REV).In case of three-wire control is enabled, "three-wire control" terminal is activated. For details, refer to F11.13 (FWD/REV terminal control mode).
4	Forward jogging	Jogging frequency, jogging acceleration and deceleration time, please refer to F01.11, F03.08, F03.09
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	External STOP terminal 1	In operation panel control, the terminal set for this function can be used to stop the AC drive, equivalent to function of the STOP key on the operation panel.
8	External STOP terminal 2	This function enables the AC drive to decelerate to stop in any control mode (operation panel, terminal or communication). In this case, the deceleration time is deceleration time 4(F03.07).
9	Immediate DC injection braking	Once the terminal set for this function becomes on, the AC drive directly switches over to DC injection braking state.
10	DEC DC injection braking	When terminal set for this function becomes on, the AC drive decelerates to DC injection braking frequency(F02.10) threshold and then switches over to DC injection braking state.
11	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 disappears, the AC drive resume to the previous state before the stop.
12	Fault reset	Same function with the Keypad on the STOP/RESET reset and used to achieve remote fault reset.
13	Shift the command 1	If command source is terminal control (F02.00 = 1,2), this terminal is used to perform switchover between terminal control and operation panel control. If command source is communication control (F02.00 =3,4), this terminal is used to perform switchover between communication control and operation panel control.

<table>
<tr><th>Setting Value</th><th>Function</th><th>Instruction</th></tr>
<tr><td>14</td><td>Shift the command 2</td><td>Terminal set for this function is used to perform switchover between terminal control and communication control.
If command source is terminal control, the AC drive switches over to communication control after the terminal becomes ON.</td></tr>
<tr><td>15</td><td>Shift frequency command</td><td>The terminal set for this function is used to perform switchover between two frequency reference setting channels according to setting in F01.04.</td></tr>
<tr><td>16</td><td>Terminal UP</td><td rowspan="2">The terminals selecting these two functions are used for increment and decrement when frequency reference is input via external DI terminal, or when frequency source is digital setting.</td></tr>
<tr><td>17</td><td>Terminal DOWN</td></tr>
<tr><td>18</td><td>Clear UP/DOWN (including∧/∨ key) adjustment</td><td>If the frequency source is digital setting, the terminal set for this function is used to clear the modification by using the UP/DOWN function or the increment/decrement key on the operation panel, restoring the frequency reference to the value of F01.04.</td></tr>
<tr><td>19</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><th>MS terminal 4</th><th>MS terminal 3</th><th>MS terminal 2</th><th>MS terminal 1</th></tr><tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr></table></td></tr>
<tr><td>20</td><td>Multi-step speed terminal 2</td></tr>
<tr><td>21</td><td>Multi-step speed terminal 3</td></tr>
<tr><td>22</td><td>Multi-step speed terminal 4</td></tr>
<tr><td>23</td><td>PLC status reset</td><td>Restart the simple PLC process, clear the previous PLC state memory information.</td></tr>
<tr><td>24</td><td>PID parameters switching</td><td>PID parameters are F19.05~F19.07 when terminal set for this function becomes off;
PID parameters are F19.13~F19.15 when terminal set for this function becomes on.</td></tr>
<tr><td>25</td><td>PID second digital given switching</td><td>For switching PID second digital given</td></tr>
<tr><td>26</td><td>PID action direction reverse</td><td>When terminal set for this function becomes on, PID operation direction is reversed to direction set in F19.04.</td></tr>
<tr><td>27</td><td>PID control pause</td><td>PID temporary failure, the AC drive maintain the current frequency output.</td></tr>
<tr><td>28</td><td>Pulse input (valid only for DI5)</td><td>DI5 is used for pulse input as frequency reference.</td></tr>
<tr><td>29</td><td>Swing pause</td><td>When terminal set for this function becomes on, the wobble function becomes disabled and the drive outputs center frequency.</td></tr>
<tr><td>30</td><td>Counter input</td><td>Terminal set for this function is used to count pulses.</td></tr>
<tr><td>31</td><td>Counter reset</td><td>Terminal set for this function is used to clear counter.</td></tr>
<tr><td>32</td><td>Length count input</td><td>Terminal set for this function is used to count pulses of the length signal.</td></tr>
<tr><td>33</td><td>Length reset</td><td>The terminal set for this function is used to clear length</td></tr>
</table>

<table>
<tr><th>Setting Value</th><th>Function</th><th>Instruction</th></tr>
<tr><td>34</td><td>Clear the current running time</td><td>Clear the running time this time.</td></tr>
<tr><td>35</td><td>Reverse prohibited</td><td>When terminal set for this function becomes on, reverse running of the AC drive is prohibited. It is the same as function of F02.14</td></tr>
<tr><td>36</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>F03.00/F03.01</td></tr>
<tr><td>OFF</td><td>ON</td><td>Dec and Acc time 2</td><td>F03.02/F03.03</td></tr>
<tr><td>ON</td><td>OFF</td><td>Dec and Acc time 3</td><td>F03.04/F03.05</td></tr>
<tr><td>ON</td><td>ON</td><td>Dec and Acc time 4</td><td>F03.06/F03.07</td></tr>
</table></td></tr>
<tr><td>37</td><td>Dec/ Acc time2</td></tr>
<tr><td>38</td><td>Dec/Acc disabling</td><td>To ensure that the AC drive is not affected by external signals (except for the shutdown command), to maintain the current output frequency.</td></tr>
<tr><td>39</td><td>External fault input 1</td><td rowspan="2">When the external fault signal sent to the AC drive, the AC drive display fault and shut down.</td></tr>
<tr><td>40</td><td>External fault input 2</td></tr>
<tr><td>41</td><td>shift the motor 1 to motor 2</td><td>When this function terminal is effective, motor 1 control switch to the motor 2 control.</td></tr>
<tr><td>42</td><td>Speed control/ Torque control switchover</td><td>This function enables the AC drive to switch over between speed control and torque control.
When terminal set for this function becomes off, the AC drive runs in the mode set in F09.00.
When terminal set for this function becomes on, the AC drive switches over to the other control mode.</td></tr>
<tr><td>43</td><td>Torque control prohibited</td><td>When the terminal set for this function becomes on, torque control is disabled and the AC drive enters speed control.</td></tr>
</table>

Function code	Name	Setup range	Default Value	Modification	Add.
F11.10	Filtering time of digital input terminal	0.000~1.000s	0.010s	○	0x0B0A

Setting DI1~DI10 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	Add.
F11.11	DI active mode selection 1	00000~11111	00000	X	0x0B0B
F11.12	DI active mode selection 2	00000~11111	00000	X	0x0B0C

These two function parameters set active mode of DI terminals.

0: High level active

If a high level voltage is applied to DI terminal, the DI signal will be seen as active. That is, the DI terminal becomes active when being connected with COM, and inactive when being disconnected from COM.

1: Low level active

If a low level voltage is applied to DI terminal, the DI signal will be seen as active. That is, the DI terminal becomes active when being disconnected from COM, and inactive when being connected with COM.

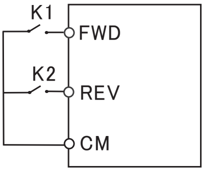
F11.11 sets the polarity selection for DI1~DI5		F11.12 sets the polarity selection for DI5~DI10	
Ones:DI1	0:Positive logic 1:Negative logic	Ones:DI6	0:Positive logic 1:Negative logic
Tens:DI2	0:Positive logic 1:Negative logic	Tens:DI7	0:Positive logic 1:Negative logic
Hundreds:DI3	0:Positive logic 1:Negative logic	Hundreds:DI8	0:Positive logic 1:Negative logic
Thousand:DI4	0:Positive logic 1:Negative logic	Thousand:DI9	0:Positive logic 1:Negative logic
Ten thousand:DI5	0:Positive logic 1:Negative logic	Ten thousand:DI10	0:Positive logic 1:Negative logic

Function code	Name	Setup range	Default Value	Modification	Add.
F11.13	Terminals control running mode	0~3	0	X	0x0B0D

This parameter defines four different modes of controlling the operation of the inverter via the external terminal.

0: Two-line running mode
This mode is the most commonly used one . The forward/reverse rotation of the motor is decided by the commands of FWD and REV terminals .

K1	K2	Running Command
0	0	Stop
1	0	Forward Rotation
0	1	Reverse Rotation
1	1	Stop

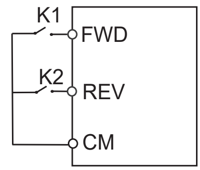


Two-line Running 1

1:Two-line running mode

When this mode is adopted , REV is enabled terminal . The direction is determined by the status of FWD .

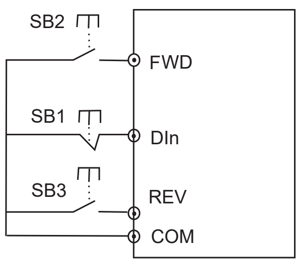
K1	K2	Running Command
0	0	Stop
1	0	Forward Rotation
1	1	Reverse Rotation
0	1	Stop



Two-line Running 2

2: Three-line running mode

In this mode , DIn is enabled terminal , and the direction is controlled by FWD and REV respectively .However , the pulse is enabled by disconnecting the signal of DIn terminal when the inverter stops .



SB1: Stop button

SB2:Forward rotation button

SB3:Reverse rotation button

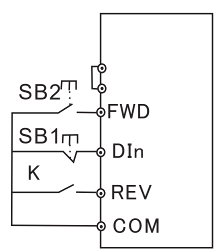
Three-line Running Mode 1

3: Three-line running mode

In this mode,DIn is enabled terminal , and the running command is given by FWD(pulse enabled), while the direction is determined by the status of REV .Stop command is performed by disconnecting the DIn signal .

K	Running Direction Selection
0	Forward Rotation
1	Reverse Rotation

SB1: Stop button
SB2: Running button



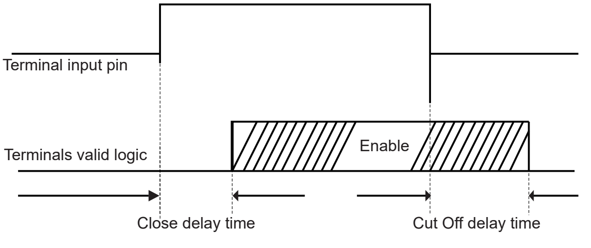
Three-line Running Mode 2

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F11.14	Terminal UP/DOWN rate	0.001Hz~65.000Hz	1.000Hz	○	0x0B0E

This parameter is used to set the step size of frequency adjustment UP/DOWN. The step size is defined as frequency change per second.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F11.15	Switch-on delay of DI1 terminal	0.0~3600.0s	0.0s	X	0x0B0F
F11.16	Switch-off delay of DI1 terminal	0.0~3600.0s	0.0s	X	0x0B10
F11.17	Switch-on delay of DI2 terminal	0.0~3600.0s	0.0s	X	0x0B11
F11.18	Switch-off delay of DI2 terminal	0.0~3600.0s	0.0s	X	0x0B12
F11.19	Switch-on delay of DI3 terminal	0.0~3600.0s	0.0s	X	0x0B13
F11.20	Switch-off delay of DI3 terminal	0.0~3600.0s	0.0s	X	0x0B14

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



Group F12
Digital Output Terminal Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.00	HDO output	0~1	0	○	0x0C00

0: Open collector pole high speed pulse output

(See F15.02 for detailed information of the related function)

1: Open collector pole output

(See F12.02 for detailed information of the related function)

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.01	DO1 output	0~37	0	○	0x0C01
F12.02	HDO output		0	○	0x0C02
F12.03	Relay T1 output		1	○	0x0C03
F12.04	Relay T2 output		7	○	0x0C04
F12.05	Relay T3 output		0	○	0x0C05

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	Zero-speed running	When the AC drive output frequency and the given frequency are zero, output ON signal.
6	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.
7	AC drive fault	When the AC drive failure, output ON signal.

Setting Value	Function	Instruction
8	AC drive overload pre-alarming	Terminal set for this function becomes on 10s before the AC drive performs overload protection.
9	Motor overload pre-alarming	The AC drive judges motor overload pre-warning according to pre warning threshold before performing overload protection. If this threshold is exceeded, terminal set for this function becomes on. For motor overload parameters, see descriptions of F29.02~F29.06
10	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 F29.07 ~F29.11 for details.
11	Frequency arrival	The operating frequency of the AC drive is within a certain range of the target frequency and outputs ON signal. Reference function code F12.17 detailed instructions.
12	Upper limit frequency arrival	When the operating frequency reaches the upper limit frequency, output ON signal.
13	Lower limit frequency arrival	When running frequency reaches frequency lower limit, terminal set for this function becomes on. When the AC drive is in stop status, terminal set for this function becomes off.
14	Frequency detection FDT1	Reference function code F12.18~F12.19 detailed instructions.
15	Frequency detection FDT2	Reference function code F12.20~F12.21 detailed instructions.
16	Any frequency 1 arrival	Please refer to function code F12.22~F12.23 for details.
17	Any frequency 2 arrival	Please refer to function code F12.24~F12.25 for details.
18	Reserved	
19	Completion of Simple PLC stage	When the current phase of the simple PLC complete operation, output signal.
20	Completion of Simple PLC Circle	When the simple PLC complete a cycle, output signal.
21	PID sleeping	When the AC drive enters PID sleep state, output ON signal
22	Any Current 1 arrival	Please refer to function code F12.28~F12.29 for details.
23	Any Current 2 arrival	Please refer to function code F12.30~F12.312 for details.
24	Load status	If the output current exceeds the rated current *F12.26, the output is valid; if the output current is lower than the rated current *F12.27, the output is invalid and remains between the two.
25	Setting count value arrival	When the value of the test over F20.08 set value, output ON signal.
26	Defined count value arrival	When the value of the test over F20.09 set value, output ON signal.

Setting Value	Function	Instruction
27	Setting length attained	When the actual length of the test is over the length of the F20.05 set, output ON signal.
28	Designated length attained	When the actual length of the test is over the length of the F20.06 set, output ON signal.
29	Setting Running time arrival	When the total running time of the AC drive over F20.10 set time , output ON signal.
30	MODBUS communications virtual terminal output	Output signal is set according to the setting value of MODBUS, 1 for ON signal, 0 for OFF signal.
31	Output DI1	Output DI1 state
32	Output DI2	Output DI2 state
33	Limit the output Di1	When the DI1 terminal is effective, the output terminal will be effective immediately. After the corresponding disconnect delay time of the set terminal, the output terminal will be invalid.
34	Ai1 input limit exceeded	Terminal set for this function becomes on when AI1 input is larger than value set in F12.33 (AI1 input voltage upper limit) or smaller than value set in F12.32 (AI1 input voltage lower limit).
35	Brake control	Reference function code F12.34~F12.40 detailed instructions.
36	PID feedback offline	Reference function code F19.27~F19.29 detailed instructions.
37	Motor overheat warning	Terminal set for this function becomes on when motor temperature reaches value set in F29.24 (Motor overheat pending threshold). You can view motor temperature by using F99.33.

Function code	Name	Setup range	Default Value	Modification	Add.
F12.06	Polarity of output terminals	00000~11111	00000	○	0xC06

This function parameter sets active mode of terminals DO1,HDO, T1, T2, and T3.

0: Positive logic

Digital output terminal becomes active when being connected with COM, and inactive when being disconnected from COM.

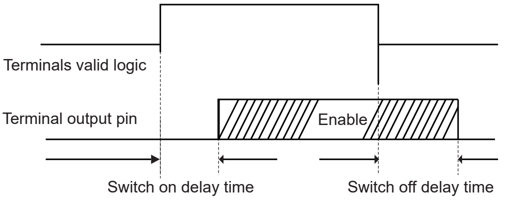
1: Negative logic

Digital output terminal becomes active when being disconnected from COM, and inactive when being connected with COM.

F12.06 sets the polarity selection for Output		
Ones:DO1	0:Positive logic	1:Negative logic
Tens:HDO	0:Positive logic	1:Negative logic
Hundreds:T1	0:Positive logic	1:Negative logic
Thousand:T2	0:Positive logic	1:Negative logic
Ten thousand:T3	0:Positive logic	1:Negative logic

Function code	Name	Setup range	Default Value	Modification	Add.
F12.07	DO1 switch-on delay time	0.0~3600.0s	0.0s	○	0x0C07
F12.08	DO1 switch-off delay time	0.0~3600.0s	0.0s	○	0x0C08
F12.09	HDO switch-on delay time	0.0~3600.0s	0.0s	○	0x0C09
F12.10	HDO switch- off delay time	0.0~3600.0s	0.0s	○	0x0C0A
F12.11	T1 switch-on delay time	0.0~3600.0s	0.0s	○	0x0C0B
F12.12	T1 switch-off delay time	0.0~3600.0s	0.0s	○	0x0C0C
F12.13	T2 switch-on delay time	0.0~3600.0s	0.0s	○	0x0C0D
F12.14	T2 switch-off delay time	0.0~3600.0s	0.0s	○	0x0C0E

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

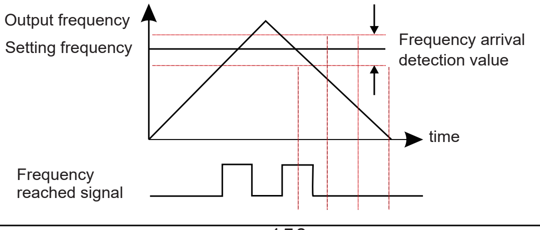


Note:

F12.09 and F12.10 valid only in F12.00 = 1.

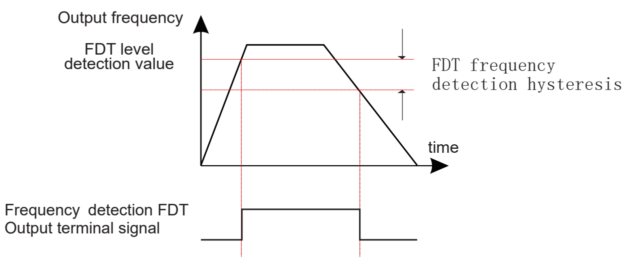
Function code	Name	Setup range	Default Value	Modification	Add.
F12.17	Frequency arrival detection value	0.0%~100.0%	0.0%	○	0x0C11

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:



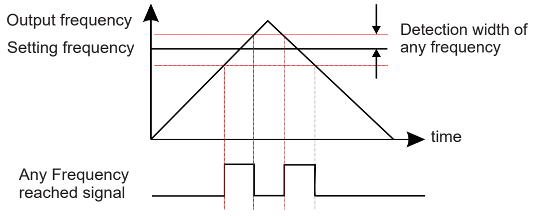
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.18	FDT1 frequency detection value	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C12
F12.19	FDT1 frequency detection hysteresis	0.0%~100.0%	5.0%	○	0x0C13
F12.20	FDT2 frequency detection value	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C14
F12.21	FDT2 frequency detection hysteresis	0.0%~100.0%	5.0%	○	0x0C15

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



Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.22	Detection of any frequency 1	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C16
F12.23	Detection width of any frequency 1	0.0%~100.0%(Max. frequency)	0	○	0x0C17
F12.24	Detection of any frequency 2	0.00Hz~F01.07(Max. frequency)	50.00Hz	○	0x0C18
F12.25	Detection width of any frequency 2	0.0%~100.0%(Max. frequency)	0	×	0x0C19

The drive provides two groups of frequency detection parameters for the digital output functions 16 and 17. When the output frequency is in the range of the detection width, the digital output terminal set for function 16 or 17 becomes on.



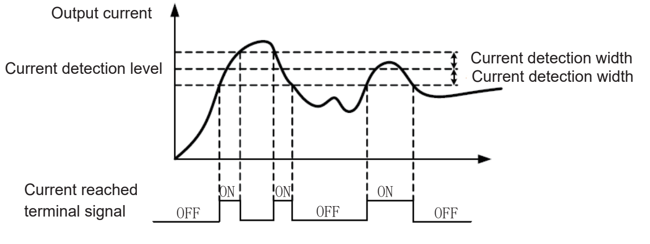
Function code	Name	Setup range	Default Value	Modification	Add.
F12.26	Upper limit of load current	0.0%~300.0%(Motor rated current)	100.0%	×	0x0C1A
F12.27	Lower limit of load current	0.0%~300.0%(Motor rated current)	50.0%	×	0x0C1B

Parameters are used to set the upper and lower limits of the load current

Function code	Name	Setup range	Default Value	Modification	Add.
F12.28	Any current reaching 1 value	0.0%~300.0%(Motor rated current)	100.0%	○	0x0C1C
F12.29	Any current reaching 1 amplitude	0.0%~300.0%(Motor rated current)	0.0%	○	0x0C1D
F12.30	Any current reaching 2 value	0.0%~300.0%(Motor rated current)	100.0%	○	0x0C1E
F12.31	Any current reaching 2 amplitude	0.0%~300.0%(Motor rated current)	0.0%	○	0x0C1F

The drive provides two groups of current detection level and width.

If output current of the AC drive reaches the width, digital output terminals set for functions 22 and 23 become on.



Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.32	AI1 input voltage lower limit	0.0V~F12.33	3. 0V	○	0x0C20
F12.33	AI1 input upper limit voltage	F12.32~10.00V	7.0V	○	0x0C21

These two functiomn parameters indicate whether AI1 input voltage is in the setting range. If AI1 input is larger than F12.33 or smaller than F12.32, digital output terminal set for function 34 becomes on.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F12.34	Mechanical brake control	0: Disabled 1: Enabled	0	×	0x0C22
F12.35	Mechanical brake open frequency	0.00Hz~10.00Hz	2.5Hz	×	0x0C23
F12.36	Mechanical brake open current	0.0%~200.0%	150.0%	×	0x0C24
F12.37	Accel delay time after brake open	0.0s~10.0s	1.0S	○	0x0C25
F12.38	Mechanical brake Freq	0.00Hz~10.00Hz	2.0Hz	×	0x0C26
F12.39	Mechanical brake close waiting time	0.0s~10.0s	1.0S	○	0x0C27
F12.40	Mechanical brake holding time	0.0s~10.0s	0.5S	○	0x0C28

F12.34 Control whether mechanical brake function is on or not

0: Disabled

1: Enabled

When the function is enabled.Process of mechanical brake control is as shown in Fig.

1) Upon the receipt of run command, the drive will accelerate to the mechanical brake open frequency set by F12.35.

2) When frequency attains the value as set by F12.35, digital output terminal "mechanical brake control" outputs ON to control the mechanical brake open.

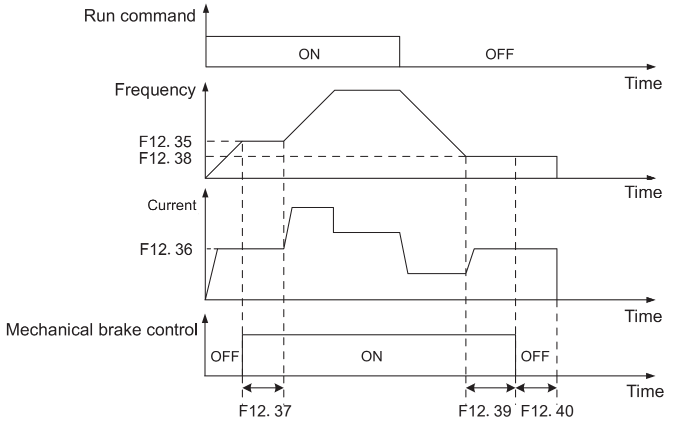
3) Perform constant-speed running at mechanical brake open frequency. During this period, the drive keeps the output current no higher than the current as set by F12.36.

4) When the run time at mechanical brake open frequency attains set value of F12.37, the AC drive will accelerate to set frequency.

5) Upon the receipt of stop command, the drive decelerate to mechanical brake close frequency set by F12.38 and maintains constant-speed running at this frequency.

6) When the run frequency attains the set value of F12.38, waiting a period of time set by F12.39, then digital output terminal "mechanical brake control" will output OFF signal to control mechanical brake close.

7) When the time of output OFF signal "mechanical brake control" attains the set value of F12.40, the drive will block the output and stop.



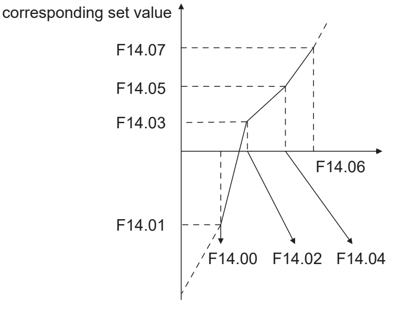
Group F14
Analog Curve And Pulse Input Setting Function Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F14.00	Lower limit of AI1	0.00V~ F14.02	0.00V	○	0x0E00
F14.01	Corresponding setting of the lower limit of AI1	-100.0%~100.0%	0.0%	○	0x0E01
F14.02	Ai1 inflexion 1 input	F14.00~F14.04	3.00V	○	0x0E02
F14.03	Corresponding percentage of AI1 inflexion 1 input	-100.0%~100.0%	30.0%	○	0x0E03
F14.04	Ai1 inflexion 2 input	F14.02~F14.06	6.00V	○	0x0E04
F14.05	Corresponding percentage of AI1 inflexion 2 input	-100.0%~100.0%	60.0%	○	0x0E05
F14.06	Upper limit of AI1	F14.04~10.00V	10.00V	○	0x0E06
F14.07	Corresponding setting of the upper limit of AI1	-100.0%~100.0%	100.0%	○	0x0E07
F14.08	Ai1 input filter time	0.00s~10.00s	0.100s	○	0x0E08

Description of input value of Ai1:

With regard to AI1, -100% corresponds to 0V or 0mA, while 100% corresponds to 10V or 20mA.(Switch by jumper)

Ai1 curve is a broken line with two inflection points. Diagram of AI curve is shown as below:



F14.08 define the filtering time of analog input terminals AI1. Long filtering time results in strong immunity from interference but slow response, while short filtering time brings rapid response but weak immunity from interference.

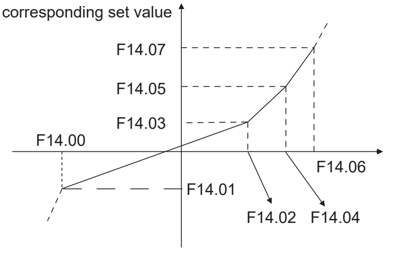
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F14.09	Lower limit of AI2	0.00V~ F14.11	0.00V	○	0x0E09
F14.10	Corresponding setting of the lower limit of AI2	-100.0%~100.0%	0.0%	○	0x0E0A
F14.11	Ai2 inflexion 1 input	F14.09~F14.13	3.00V	○	0x0E0B
F14.12	Corresponding percentage of AI2 inflexion 1 input	-100.0%~100.0%	30.0%	○	0x0E0C
F14.13	AI2 inflexion 2 input	F14.11~F14.15	6.00V	○	0x0E0D
F14.14	Corresponding percentage of AI2 inflexion 2 input	-100.0%~100.0%	60.0%	○	0x0E0E
F14.15	Upper limit of AI2	F14.13~10.00V	10.00V	○	0x0E0F
F14.16	Corresponding setting of the upper limit of AI2	-100.0%~100.0%	100.0%	○	0x0E10
F14.17	AI2 input filter time	0.00s~10.00s	0.100s	○	0x0E11

The input of Ai2 curve and the definition of corresponding set value is the same as AI1.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F14.18	Lower limit of AI3	-10.00V~ F14.20	-10.00V	○	0x0E12
F14.19	Corresponding setting of the lower limit of AI3	-100.0%~100.0%	-100.0%	○	0x0E13
F14.20	AI 3 inflexion 1 input	F14.18~F14.22	-3.00V	○	0x0E14
F14.21	Corresponding percentage of AI3 inflexion 1 input	-100.0%~100.0%	-30.0%	○	0x0E15
F14.22	AI3 inflexion 2 input	F14.20~F14.24	3.00V	○	0x0E16
F14.23	Corresponding percentage of AI3 inflexion 2 input	-100.0%~100.0%	30.0%	○	0x0E17
F14.24	Upper limit of AI 3	F14.22~10.00V	10.00V	○	0x0E18
F14.25	Corresponding setting of the upper limit of AI3	-100.0%~100.0%	100.0%	○	0x0E19
F14.26	Ai3 input filter time	0.00s~10.00s	0.10s	○	0x0E1A

Description of input value of Ai3 curve :

Regarding to AI3, -100% corresponds to -10V, while 100% corresponds to 10V.



Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F14.27	AI lower than Min. input setting selection	000~111	000	○	0x0E1B

When analog input voltage is below the value of F14.00,F14.09,F14.18, the AC drive uses the minimum value or 0.0%, determined by the setting of F14.27.

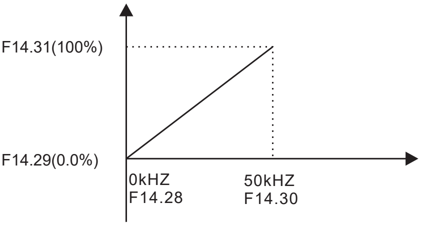
F14.27 SETS THE AI LOWER	
Ones:AI1	0: Corresponding percentage of min. input; 1:0.0%
Tens:AI2	0: Corresponding percentage of min. input; 1:0.0%
Hundreds:AI3	0: Corresponding percentage of min. input; 1:0.0%

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F14. 28	Lower limit frequency of pulse DI5	0.00kHz~F14.30	0.00 kHz	○	0x0E1C
F14. 29	Corresponding setting of lower limit frequency of pulse DI5	-100.0%~100.0%	0.0%	○	0x0E1D
F14. 30	Upper limit frequency of pulse DI5	F14.28~100.00kHz	50.00 kHz	○	0x0E1E
F14. 31	Corresponding setting of upper limit frequency of pulse DI5	-100.0%~100.0%	100.0%	○	0x0E1F
F14. 32	Input filter time of pulse DI5	0.00s~10.00s	0.10s	○	0x0E20

When digital input terminal DI5 receives pulse signal as frequency reference, the relation between input pulse signal and set frequency is defined by curves set by F14.28~F14.32.

F14.28 and F14.30 represent the range of DI input pulse frequency, 100kHz at maximum.

F14.29 and F14.31 are the set values of frequency that corresponds to DI input pulse frequency:100% corresponds to positive maximum frequency while -100% corresponds to negative maximum frequency.



default curve

Group F15
Analog Curve And Pulse Output Setting Function Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F15.00	AO1 output	0~14	0	○	0x0F00
F15.01	AO2 output		1	○	0x0F01
F15.02	HDO output		0	○	0x0F02

These parameters select the function of the pulse output terminal and the two analog output terminals.The pulse output frequency range of the HDO terminal is 0.01 kHz to F15.14 (Max. HDO output frequency). F15.14 must be set in the range of 0.01 to 100.00 kHz.

The output range of AO1 and AO2 is 0 to 10 V or 0 to 20 mA.

The functions of the three terminals are listed in the following table.

The Output Range Description of Analog Quantity or High Speed Pulse

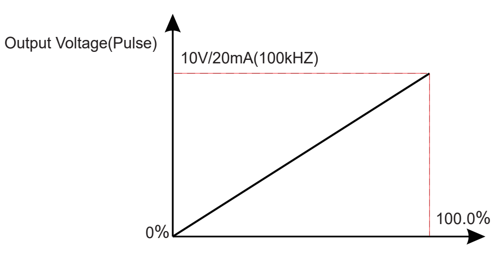
Setting Value	Function	Instruction
0	Running frequency	0~Maximum output frequency(Corresponding to 0~100%)
1	Set frequency	0~Maximum output frequency(Corresponding to 0~100%)
2	Output current	The motor rated current 0~2 times (corresponding to 0~100%)
3	Output voltage	The AC drive rated voltage 0~1.5 (corresponding to 0~100%)
4	High speed pulse DI5 input value	0.00~100.00kHz(corresponding to 0~100%)
5	Analog AI1 input value	0~10V/0~20mA(corresponding to 0~100%)
6	Analog AI2 input value	0~10V/0~20mA(corresponding to 0~100%)
7	Analog AI3 input value	-10V~10V(corresponding to 0~100%)
8	Length	0 to max. set length(corresponding to 0~100%)
9	Count value	0 to max. count value (corresponding to 0~100%)
10	Running time	0 to max. Running time(corresponding to 0~100%)
11	Output torque	The rated torque 0~2 times(corresponding to 0~100%)
12	Output power	The rated power 0~2 times(corresponding to 0~100%)
13	Communications reference	0.0%~100.0%(corresponding to 0~100%)
14	Keypad potentiometer setting	0~10V (corresponding to 0~100%)

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F15.03	Lower output limit of AO1	0.0%~F15.05	0.0%	○	0x0F03
F15.04	Corresponding AO1 output of lower limit	0.00V~10.00V	0.00V	○	0x0F04
F15.05	Upper output limit of AO1	F15.03~100.0%	100.0%	○	0x0F05
F15.06	The corresponding AO1 output of upper limit	0.00V~10.00V	10.00V	○	0x0F06
F15.07	Lower output limit of AO2	0.0%~F15.09	0.0%	○	0x0F07
F15.08	Corresponding AO2 output of lower limit	0.00V~10.00V	0.0%	○	0x0F08
F15.09	Upper output limit of AO2	F15.07~100.0%	100.0%	○	0x0F09
F15.10	The corresponding AO2 output of upper limit	0.00V~10.00V	10.00V	○	0x0F0A
F15.11	Lower output limit of HDO	0.0%~F15.13	0.0%	○	0x0F0B
F15.12	Corresponding HDO output of lower limit	0.00~100.00kHz	0.00Hz	○	0x0F0C
F15.13	Upper output limit of HDO	F15.11~100.0%	100.0%	○	0x0F0D
F15.14	Corresponding HDO output of upper limit	0.00~100.00kHz	100.00 kHz	○	0x0F0E

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 F16 AI/AO Correction Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F16.00	AI,AO corrective active selection	0: No action 1: AI1 channel correction 2: AI2 channel correction 3: AI3 channel correction 4: AO1 channel correction 5: AO2 channel correction	0	○	0x1000
F16.01	AI1 measured voltage1	0.000V~10.000V	Correction before delivery	○	0x1001
F16.02	AI1 display voltage1	0.000V~10.000V		○	0x1002
F16.03	AI1 measured voltage2	0.000V~10.000V		○	0x1003
F16.04	AI1 display voltage 2	0.000V~10.000V		○	0x1004
F16.05	AI2 measured voltage1	0.000V~10.000V		○	0x1005
F16.06	AI2 display voltage1	0.000V~10.000V		○	0x1006
F16.07	AI2 measured voltage 2	0.000V~10.000V		○	0x1007
F16.08	AI2 display voltage 2	0.000V~10.000V		○	0x1008
F16.09	AI3 measured voltage 1	0.000V~10.000V		○	0x1009
F16.10	AI3 display voltage 1	0.000V~10.000V		○	0x100A
F16.11	AI3 measured voltage 2	0.00V~10.000V		○	0x100B
F16.12	AI3 display voltage 2	0.00V~10.000V		○	0x100C
F16.13	AO1 measured voltage 1	0.000V~10.000V		○	0x100D
F16.14	AO1 display voltage 1	0.000V~10.000V		○	0x100E
F16.15	AO1 measured voltage 2	0.000V~10.000V		○	0x100F
F16.16	AO1 display voltage 2	0.000V~10.000V		○	0x1010
F16.17	AO2 measured voltage1	0.000V~10.000V		○	0x1011
F16.18	AO2 display voltage1	0.000V~10.000V		○	0x1012
F16.19	AO2 measured voltage 2	0.000V~10.000V		○	0x1013
F16.20	AO2 display voltage 2	0.000V~10.000V		○	0x1014

Take the correction of AI1 as an example:
1)First set F16.00 to 1 to correct the AI1 channel. After setting 1, the parameter is automatically cleared.

2)Observe the voltage value of the AI1 input through F99.12, record the displayed value and the measured value of the two points that need to be collected in turn, and then subparameter input into parameters F16.01~F16.04, the correction of AI1 can be completed.
3)The AO correction method is the same as the enumerated AI1 method.

Group F18
Serial Communication Function Group

Function code	Name	Setup range	Default Value	Modification	Add.
F18.00	Local communication address	0~247	1	○	0x1200

0: Broadcast address

1: Slaver address

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	Add.
F18.01	Communication baud rate		45	○	0x1201

This parameter is used to set transmission speed between host computer and AC drive.

Note that baud rate of host computer must be the same as that of AC drive. Otherwise, communication shall fail. The higher baud rate is, the faster communication will be.

Ones :
Modbus Communication baud rate
0: 300 bps
1: 600 bps
2: 1200 bps
3: 2400 bps
4: 4800 bps
5: 9600 bps
6: 19200 bps
7: 38400 bps
8: 57600 bps
9: 115200 bps

Tens :
CAN Communication baud rate
0:20 kbps
1:50 kbps
2:100 kbps
3:125 kbps
4:250 kbps
5:500 kbps
6:1 Mbps

Function code	Name	Setup range	Default Value	Modification	Add.
F18.02	Data format symbol	0~3	0	○	0x1202

0: No check (8-N-2)

1: Even parity check (8-E-1)

2: Odd parity check (8-O-1)

3: No check, data format (8-N-1)

Note:

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

Function code	Name	Setup range	Default Value	Modification	Add.
F18.03	Answer delay	0~20ms	2ms	○	0x1203

This parameter sets interval between AC drive completing receiving data and AC drive sending data to host computer. If response delay is shorter than system processing time, system processing time shall prevail. If response delay is longer than system processing time, system sends data to host computer only after response delay is up.

Function code	Name	Setup range	Default Value	Modification	Add.
F18.04	Fault time of communication overtime	0.0s ~60.0s	0.0s	○	0x1204

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 "Communcation Fault" (E.CE).

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

Funtion code	Name	Setup range	Default Value	Modification	Add.
F18.05	Transmission fault proccessing	0~2	0	○	0x1205

0: Alarm and stop freely

1: Alarm and stop according to the stop mode

2: No alarm and continue to run

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F18.06	Current resolution readby communication	0: 0.01A 1: 0.1A	0	○	0x1206

This parameter is used to set unit of output current read by communication.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F18.07	Modbus Protocol compatibility selection	0~2	0	○	0x1207

0: KM600 protocol

1: KM100 protocol

2: KM200 protocol

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F18.09	Communication protocol selection	00~13	00	○	0x1209

Ones:
Communication run
command channel selection
0: Modbus
1: Profibus-DP
2: CAN
3: CANopen
Tens :
Communication protocol selection
0: Modbus
1: CANopen

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F18.10	PPO type	0: PPO1 format 1: PP02 format 2: PPO3 format 3: PPO4 format 4: PPO5 format	2	×	0x120A
F18.11	DP slave address	1~127	1	×	0x120B
F18.12	PZD3 Write	0: No operation 1: Communication setting frequency 2: PID Given value(0~PID range) 3: PID feedback(0~PID range) 4: Torque setting value(-10000~10000) 5: Forward upper limit frequency setting value (0~10000) 6: Reverse upper limit frequency setting value (0~10000) 7: Electric torque upper limit torque(0~10000) 8: Braking torque upper limit torque(0~10000) 9: Virtual output terminal command 10: Voltage setting (V/F separation purpose)(0~1000) 11: AO1 output setting (0~0X7FFF) 12: AO2 output setting (0~0X7FFF) 13: HDO output setting (0~0X7FFF)	0	○	0x120C
F18.13	PZD4 Write		0	○	0x120D
F18.14	PZD5 Write		0	○	0x120E
F18.15	PZD6 Write		0	○	0x120F
F18.16	PZD7 Write		0	○	0x1210
F18.17	PZD8 Write		0	○	0x1211
F18.18	PZD9 Write		0	○	0x1212
F18.19	PZD10 Write		0	○	0x1213
F18.20	PZD11 Write		0	○	0x1214
F18.21	PZD12 Write		0	○	0x1215
F18.12	PZD3 Read	0: No-operation 1~40: Corresponding to F99.01~F99.40 41: Running frequency at current fault 42: Output current at current fault 43: Output voltage at current fault 44: Bus voltage at current fault 45: The Max. temperature at current fault 46: Input terminal state at current fault 47: Output terminal state at current fault 48: Inverter status at current fault 49: Power on time at current fault 50: Running time at current fault	0	○	0x1216
F18.13	PZD4 Read		0	○	0x1217
F18.14	PZD5 Read		0	○	0x1218
F18.15	PZD6 Read		0	○	0x1219
F18.16	PZD7 Read		0	○	0x121A
F18.17	PZD8 Read		0	○	0x121B
F18.18	PZD9 Read		0	○	0x121C
F18.19	PZD10 Read		0	○	0x121D
F18.20	PZD11 Read		0	○	0x121E
F18.21	PZD12 Read		0	○	0x121F

Please refer to Profibus-DP Card User Manual for details.

Group F19 PID Control Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.00	PID reference source	00~86	01	○	0x1300

Ones:
PID reference source.
0: Keypad potentiometer setting
1: PID digital setting(F19.02)
2: AI1
3: AI2
4: AI3
5: Pulse DI5
6: Communication setting

Tens:
PID feedback source.
0: AI1
1: AI2
2: AI3
3: AI1+AI2
4: AI1-AI2
5: MAX(AI1,AI2)
6: MIN(AI1,AI2)
7: Pulse DI5
8: Communication setting

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.01	PID range	0~65535	1000	○	0x1301

The PID range is a dimensionless unit used to display a given AND feedback PID.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.02	PID digital 1 setting	0~F19.01	500	○	0x1302
F19.03	PID digital 2 setting	0~F19.01	500	○	0x1303

Set this parameter when F19.00's ones is set to 1.PID setting is determined through this parameter, and the range is 0 ~ PID range (F19.01).

The frequency converter provides two digital Settings, which can be switched through the function of DI terminal 25 "PID second number given value switch”

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.04	PID operation direction	0~1	0	○	0x1304

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	Modifi-cation	Add.
F19.05	Proportional gain(P1)	0.00~100.0%	20.0%	○	0x1305
F19.06	Intergal time(I1)	0.0~100.0s	2.0s	○	0x1306
F19.07	Differential time(D1)	0.00~10.00s	0.00s	○	0x1307

Process PID is provided with two groups of proportion, integral and derivative parameters set by F19.05~F9.07 are the first group of parameters.F19.13~F19.15 are the second group of parameters.They are toggled through the function code DI terminal function 24 "PID parameter switch"

Proportional gain P1: dynamic response of the system can be quickened by increasing proportional gain P1. However, excessive P1 value would bring about system oscillation. Only proportional gain control cannot eliminate steady state error.

Integration time I1: dynamic response of the system can be quickened by reducing integration time I1. However, excessively small I1 value would result in serious system overshooting and may easily bring about oscillation. Integral control can be used to eliminate steady state error but is unable to control sharp changes.

Derivative time D1: it can predict the change trend of offset and thus can rapidly respond to the change, improving dynamic performance. However, this is vulnerable to interference. Please use derivative control with caution.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.08	PID offset limit	0.00~50.0%	0.0%	○	0x1308

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	Add.
F19.09	PID differential limit	0.0%~100.0%	1.0%	○	0x1309

F19.09 applies a limit to PID differential output as a large output can cause excessive system oscillation.

Function code	Name	Setup range	Default Value	Modification	Add.
F19.10	PID reference change time	0.00~650.00s	0.00s	○	0x130A
F19.11	PID feedback filter time	0.00~60.00s	0.00s	○	0x130B
F19.12	PID output filter time	0.00~60.00s	0.00s	○	0x130C

F19.10 sets time it takes PID reference to change from 0.0% to 100.0%. PID reference changes linearly based on the time set in this parameter, reducing negative impact of sudden PID reference change.

F19.11 filters the PID feedback, which helps to lower interference on PID feedback but slows system response performance.

F19.12 filters the PID output frequency, which helps to drop off mutation of the AC drive output frequency but slows system response performance.

Function code	Name	Setup range	Default Value	Modification	Add.
F19.13	Proportional gain(P2)	0.00~100.0%	20.0%	○	0x130D
F19.14	Intergal time(I2)	0.0~100.0s	2.0s	○	0x130E
F19.15	Differential time(D2)	0.00~10.00s	0.00s	○	0x130F

Process PID is provided with two groups of proportion, integral and derivative parameters set

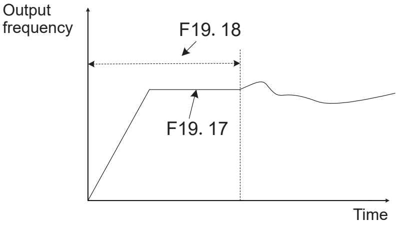
by F19.05~F9.07 are the first group of parameters.F19.13~F19.15 are the second group of parameters.They are toggled through the function code DI terminal function 24 "PID parameter switch"

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.16	Upper limit Freq when opposite to rotary set direction	0.00Hz~F01.07(max. frequency)	0.00Hz	○	0x1310

In some cases, only when the PID output frequency is negative (REV), the PID can control the quantitative and feedback to the same state, but too high reversal frequency is not allowed in some cases, F19.16 is used to determine the upper limit of the reversal frequency.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.17	PID Preset Value	0.0%~100.0%	0.0%	○	0x1311
F19.18	PID Preset Value Keeping time	0.0~650.0s	0.00s	○	0x1312

PID does not make adjustment when the drive starts its running, but outputs the value set by F19.17 and maintains the holding time set by F19.18, then starts PID adjustment. When F19.18 is set to 0, PID initial value is disabled. This function makes PID adjustment get into stable status fast.



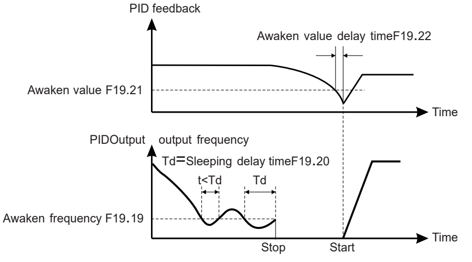
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.19	PID Hibernate Frequency	0.00Hz~F01.07(max. frequency)	0.0	○	0x1313
F19.20	PID Hibernate Delay Time	0.0~6500.0s	30.0s	○	0x1314

When the PID output frequency is less than the PID Hibernate frequency setted by F19.19, after the PID hibernate delay time setted by F19.20, AC drive will enter into the hibernate status and stop by the way of coasting to stop

Select 21 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	Modifi-cation	Add.
F19.21	PID Awaken Value	0.0~100.0%	0.0%	○	0x1315
F19.22	PID Awaken Value delay time	0.0~6500.0s	0.5S	○	0x1316

When AC drive is in sleeping state, PID feedback value (PID given value X F19.21), with the delay time of PID Awaken Values which is set by F19.22, the AC drive will be awakened and restart.



PID Sleeping/Awaken Diagram

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.23	Upper protective pressure value	0.0%~100.0%	100.0%	○	0x1317
F19.24	Upper limit protection detection time	0.0s~1000.0s	1.0s	○	0x1318

When the feedback pressure is greater than the upper limit protection pressure and the duration is greater than the upper limit protection detection time, the converter will enter the forced sleep state, and the wake-up mode is that the feedback value is less than the wake-up value and the duration exceeds the wake-up delay time.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F19.25	Forced sleep deviation	0.0%~50.0%	0.0%	○	0x1319
F19.26	Forced sleep delay time	0.0~6000.0s	0.0S	○	0x131A

When the feedback pressure is greater than (PID set value - forced dormancy deviation) and the duration time exceeds PID forced dormancy delay, the AC drive enters into forced dormancy state. The wake-up mode is that the feedback value is less than the duration time of the wake-up value exceeds the delay time of the wake-up.

NOTE:

100.0% of the parameter corresponds to the full range. After the converter runs, the function will be activated only when the feedback pressure is greater than the set pressure once.

Function code	Name	Setup range	Default Value	Modification	Add.
F19.27	Detection value of feedback offline	0.0~100.0%	0.0%	○	0x131B
F19.28	Detection time of feedback offline	0.0~6500.0s	0.0s	○	0x131C
F19.29	PID feedback offline processing	0~2	0	○	0x131D

When PID feedback is lower than F19.27 and last F19.28 setting detection time, The ac drive enters dormancy state. The next action of the AC drive is set by parameter F19.29

0: Alarm E.PID and stop freely

1: Alarm E.PID and stop according to the stop mode(F02.09)

2: No alarm and continue to run

Note: The inverter can set the output terminal function 36 "PID disconnected signal output" to output feedback disconnected signal.

Function code	Name	Setup range	Default Value	Modification	Add.
F19.30	PID range decimal number	0~4	0	○	0x131E

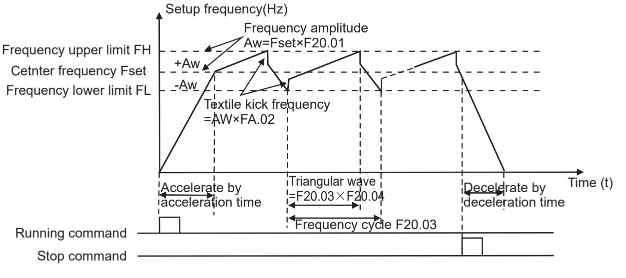
PID range, PID given, THE number of decimal points displayed by PID feedback, in order to facilitate the user to define the dimensional unit displayed by PID.

Group F20
Swing Frequency, Fixed Length, Count and Timing

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F20.00	Swing Frequency setting mode	0~1	0	○	0x1400
F20.01	Swing frequency amplitude	0.0~100.0%	0.0%	○	0x1401
F20.02	Kick frequency amplitude	0.0~50.0%	0.0%	○	0x1402
F20.03	Cycle of swing frequency	0.1s~3000.0s	10.0s	○	0x1403
F20.04	Triangular wave ramp-up time coefficient	0.1%~100.0%	50.0%	○	0x1404

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

The swing frequency function means that the output frequency of the inverter swings up and down with the setup frequency (frequency command is selected by F01.04) as the center . The trace of running frequency at the time axis is shown as the figure below , in which the swing amplitude is set by F20.01 and F20.02 .



The parameter is used to determine the swing amplitude benchmark .

0: Relative to the central frequency , and it is a variable swing amplitude system . The swing amplitude varies with the central frequency (setup frequency) .

1:Relative to the maximum frequency (F01.07) , and it is fixed swing amplitude system . The swing amplitude is fixed .

F20.01,F20.02 are used to determine the values of swing amplitude and kick frequency .

Swing amplitude AW (variable swing amplitude) = frequency source F01.04 x swing amplitude F20.01
Swing amplitude AW (fixed swing amplitude) = upper frequency F01.07x swing amplitude F20.01

Kick frequency = swing amplitude AW x kick frequency amplitude F20.02

NOTE:

The swing frequency is limited by the frequency upper limit and frequency lower limit .If the setting is inappropriate , it works abnormally .

If the swing amplitude relative to the central frequency is selected , the kick frequency is a variable value .

If the swing amplitude relative to the upper limit frequency is selected , the kick frequency is a fixed value .

F20.03,F20.04

Swing frequency : I t refers to the time of a complete cycle of swing frequency .
F20.04 Time constant of triangular wave boost is relative to
F20.03 swing frequency cycle .
Triangular wave boost time = FA.03xFA.04(unit : s)
Triangular wave falling time = FA.03 x(1- FA.04)(unit : s)

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F20.05	Setup length	0~65535m	1000m	○	0x1405
F20.06	Designed length	0~65535m	1m	○	0x1406
F20.07	The number of pulses of each meter	0.1~6553.5	100.0	○	0x1407

The above function code is used for fixed-length control.

The length information needs to be collected through the multi-function digital input terminal. The number of pulses sampled by the terminal is divided by the number of pulses per meter F20.07, and the actual length can be calculated.When the actual length is greater than the set length F20.05, the multi-function digital DO outputs the "set length arrives" ON signal.

During the fixed-length control process, the length reset operation can be carried out through the multi-function DI terminal (DI function is 33), please refer to group F11 for details.

In the application, the corresponding input terminal function should be set as "length count input" (function 32). When the pulse frequency is high, the DI5 port must be used.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F20.08	Set count value	1~65535	1000	○	0x1408
F20.09	Designated count value	1~65535	1	○	0x1409

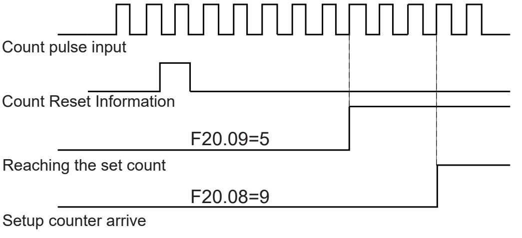
The drive has the counting function. The sampling DI terminal must be set for function 30 "Counter input ". For high pulse frequency, use terminal DI5.

When the counting value reaches the level set in F20.05, digital output terminal set for function 25 "Setup count value reached" becomes on.

When the counting value reaches the level set in F20.06, digital output terminal set for function 26 "Designated count value reached" becomes on.

Counter reset can be implemented via DI terminal set for function 31 "Counter reset".

F20.09 designated counting value is not greater than the set count value F20.08.



Function code	Name	Setup range	Default Value	Modification	Add.
F20.10	Running time setting	0.0~65535min	0.0Min	○	0x140A

Pre-seting AC drive running time. When the accumulated running time reaches the setting running time, the multi-function digital output terminal 29"Setting Running time arrival" signal.

The terminal input function 34 "timer reset" can be used to reset the running time.

Function code	Name	Setup range	Default Value	Modification	Add.
F20.11	Exact stop mode	0~3	0	○	0x140B

0 : Invalid

1 : Setting length arrive

2 : Setting count value arrive

3 : Setting running time arrive

When F20.11 is set to non-0, the AC drive will stop according to the set conditions when the conditions are met.

Group F21
Simple PLC and Multi-step Freq Control Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F21.00	Multi-step Freq 0	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1500
F21.01	Multi-step Freq 1	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1501
F21.02	Multi-step Freq 2	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1502
F21.03	Multi-step Freq 3	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1503
F21.04	Multi-step Freq 4	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1504
F21.05	Multi-step Freq 5	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1505
F21.06	Multi-step Freq 6	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1506
F21.07	Multi-step Freq 7	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1507
F21.08	Multi-step Freq 8	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1508
F21.09	Multi-step Freq 9	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x1509
F21.10	Multi-step Freq 10	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150A
F21.11	Multi-step Freq 11	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150B
F21.12	Multi-step Freq 12	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150C
F21.13	Multi-step Freq 13	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150D
F21.14	Multi-step Freq 14	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150E
F21.15	Multi-step Freq 15	0.0Hz~F01.07(Max.Freq)	0.00Hz	○	0x150F

In multi-reference mode, combinations of different DI(19 ~ 22 DI function) terminal states correspond to different frequency references. The AC drive supports a maximum of 16 references implemented by 16 state combinations of four DI terminals.

If a DI terminal is used for the multi-reference function, you need to set related parameters in group F11.

K4	K3	K2	K1	Reference Setting	Corresponding Pr.
OFF	OFF	OFF	OFF	Reference 0	F21.00
OFF	OFF	OFF	ON	Reference 1	F21.01
OFF	OFF	ON	OFF	Reference 2	F21.02
OFF	OFF	ON	ON	Reference 3	F21.03
OFF	ON	OFF	OFF	Reference 4	F21.04
OFF	ON	OFF	ON	Reference 5	F21.05
OFF	ON	ON	OFF	Reference 6	F21.06
OFF	ON	ON	ON	Reference 7	F21.07

K4	K3	K2	K1	Reference Setting	Corresponding Pr.
ON	OFF	OFF	OFF	Reference 8	F21.08
ON	OFF	OFF	ON	Reference 9	F21.09
ON	OFF	ON	OFF	Reference 10	F21.10
ON	OFF	ON	ON	Reference 11	F21.11
ON	ON	OFF	OFF	Reference 12	F21.12
ON	ON	OFF	ON	Reference 13	F21.13
ON	ON	ON	OFF	Reference 14	F21.14
ON	ON	ON	ON	Reference 15	F21.15

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F21.16	Simple PLC running method	00~11	00	○	0x1510

Ones : PLC run mode

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

Tens : Unit of simple PLC runtime

0: Second (s)

1: Minute (min)

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F21.17	Simple PLC memory selection when in power loss		00	○	0x1511

F21.17 determines whether the running data is retentive at power down or at stop.

If retentive, the running data is memorized at power down or at stop and the AC drive will continue to run from the memorized data at next power-on.

If not retentive, the AC drive runs from the first simple PLC reference at next power-on.

Ones: Power loss memory
0:No memory on power loss
1: Memorized on power loss
Tens: Stop memory
0:No memory on stop
1: Memorized on stop

Function code	Name	Setup range	Default Value	Modification	Add.
F21.18	The running time of step 0	0.0~6553.5s(min)	0.00s (Min)	○	0x1512
F21.19	Setting of multi-step 0	000~831	000	○	0x1513

F21.18 sets the run time for step 0 of simple PLC and the time unit is set by tens place of F21.16.

F21.19 Set the working state of step 0

Ones :Run direction,

Sets the run direction for step 0 of simple PLC.
0: Forward
1: Reverse

Tens: Accel/Decel time,

Sets the Accel/Decel time step 0.The Accel/Decel time of simple PLC running is set here, not determined by digital input terminal "Accel/Decel time determinant 1-2". In addition, Accel/Decel time unit is set through tens place of F21.16
0: Accel/Decel time 1
1: Accel/Decel time 2
2: Accel/Decel time 3
3: Accel/Decel time 4
Hundreds : Freq setting

Sets the frequency reference of step 0 of simple PLC.

0: Multi-step Freq 0 (F21.00)
1: Keypad digital setting
2: Keypad potentiometer setting
3: AI1 setting
4: AI2 setting
5: AI3 setting
6: DI5 pulse input
7: Process PID output
8: Communication setting

Function code	Name	Setup range	Default Value	Modification	Add.
F21.20	The running time of step 1	0.0~6553.5s(min)	0.0s	○	0x1514
F21.21	Setting of multi-step 1	Same as F21-19	000	○	0x1515
F21.22	The running time of step 2	0.0~6553.5s(min)	0.0s	○	0x1516
F21.23	Setting of multi-step 2	Same as F21-19	000	○	0x1517

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F21.24	The running time of step 3	0.0~6553.5s(min)	0.0s	○	0x1518
F21.25	Setting of multi-step 3	Same as F21-19	000	○	0x1519
F21.26	The running time of step 4	0.0~6553.5s(min)	0.0s	○	0x151A
F21.27	Setting of multi-step 4	Same as F21-19	000	○	0x151B
F21.28	The running time of step 5	0.0~6553.5s(min)	0.0s	○	0x151C
F21.29	Setting of multi-step 5	Same as F21-19	000	○	0x151D
F21.30	The running time of step 6	0.0~6553.5s(min)	0.0s	○	0x151E
F21.31	Setting of multi-step 6	Same as F21-19	000	○	0x151F
F21.32	The running time of step 7	0.0~6553.5s(min)	0.0s	○	0x1520
F21.33	Setting of multi-step 7	Same as F21-19	000	○	0x1521
F21.34	The running time of step 8	0.0~6553.5s(min)	0.0s	○	0x1522
F21.35	Setting of multi-step 8	Same as F21-19	000	○	0x1523
F21.36	The running time of step 9	0.0~6553.5s(min)	0.0s	○	0x1524
F21.37	Setting of multi-step 9	Same as F21-19	000	○	0x1525
F21.38	The running time of step 10	0.0~6553.5s(min)	0.0s	○	0x1526
F21.39	Setting of multi-step 10	Same as F21-19	000	○	0x1527
F21.40	The running time of step 11	0.0~6553.5s(min)	0.0s	○	0x1528
F21.41	Setting of multi-step 11	Same as F21-19	000	○	0x1529
F21.42	The running time of step 12	0.0~6553.5s(min)	0.0s	○	0x152A
F21.43	Setting of multi-step 12	Same as F21-19	000	○	0x152B

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F21.44	The running time of step 13	0.0~6553.5s(min)	0.0s	○	0x152C
F21.45	Setting of multi-step 13	Same as F21-19	000	○	0x152D
F21.46	The running time of step 14	0.0~6553.5s(min)	0.0s	○	0x152E
F21.47	Setting of multi-step 14	Same as F21-19	000	○	0x152F
F21.48	The running time of step 15	0.0~6553.5s(min)	0.0s	○	0x1530
F21.49	Setting of multi-step 15	Same as F21-19	000	○	0x1531

For other step parameters, please refer to step 0.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F21.50	PLC model	0: PLC model 1 1: PLC model 2	0	○	0x1532

0: PLC mode 1

Standard PLC mode, each steps runs according to the set time and acceleration and deceleration time.

1: PLC mode 2

Increase or decrease from the current segment at a set running time to the next segment frequency.

Group F28
Strengthen Function Groups

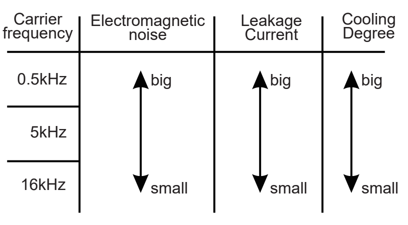
Function code	Name	Setup range	Default Value	Modification	Add.
F28.00	Carrier frequency setting	1.0~16.0	Model dependent	○	0x1C00

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% .



The relationship table of the motor type and carrier frequency

Model	Carrier frequency Default
0.7～11kW	6kHz
15~45kW	4kHz
55kW	3kHz
More than 75kW	2kHz

Tips for PWM switching frequency setting:

1) When the motor line is too long, reduce switching frequency.

2) When torque at low speed is unstable, reduce switching frequency.

3) If the drive produces severe interference to surrounding equipment, reduce switching frequency.

4) Leakage current of the drive is big, reduce switching frequency.

5) Drive temperature rise is relatively high, reduce switching frequency.

6) Motor temperature rise is relatively high, increase switching frequency.

7) Motor noise is relatively big, increase switching frequency.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F28.01	Carrier frequency adjusted with temperature	0~1	1	○	0x1C01

0: Invalid
1: Valid

When self-adaption of PWM switching frequency is selected, the drive will automatically reduce switching frequency with the temperature rise, protecting itself against overheat. Set to 0 where PWM switching frequency change is not allowed.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F28.02	PWM mode	0~1	0	×	0x1C02

0: Three-phase modulation

1: Three-phase and two-phase modulation switching

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F28.03	Random PWM	0~10	0	×	0x1C03

This parameter helps to lower motor audible noise and reduce electromagnetic interference.

0: Fixed PWM

1~10: Random PWM coefficient

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F28.04	Voltage over modulation coefficient	100~110	105	×	0x1C04

This parameter indicates boost capacity of maximum voltage of the AC drive. Increasing F28.04 will improve max. loading capacity in motor field weakening area. Be aware that this may lead toan increase in motor current ripple and an increase in motor heating.

Decreasing it will reduce motor current ripple and motor heating. Be aware that this will lower max. loading capacity in motor field weakening area. Adjustment of this parameter is not required normally

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F28.04	Cooling fan working mode	0~1	0	×	0x1C05

This function parameter sets working mode of cooling fan.

0: Working during drive running

The fan works during drive running. When the drive stops, the fan works if heatsink temperature is above 40°C and stops if heat sink temperature is below 40°C.

1: Working continuously

The fan keeps working after power-on

Group F29
Protection Parameters Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.00	Phase loss protection	00~11	11	×	0x1D00

Ones: Input phase loss protection
0: Disable
1: Enable. If input phase loss,The AC drive alarm E.SPI
Tens: Output phase loss protection
0: Disable
1: Enable.If output phase loss,The AC drive alarm E.SPO

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.01	Detection of short-circuit to ground	00~11	0x01	×	0x1D01

Ones: Detection of short-circuit to ground upon power-on
0: Disable
1: Enable

Tens: Before running detection of short-circuit to ground
0: Disable
1: Enable

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.02	Motor overload protection		1	×	0x1D02
F29.03	Motor overload protection gain	50~300	100	×	0x1D03

F19.02 Select whether to turn on motor overload protection

0: Invalid

The motor overload protection is disabled. In this case, install a thermal relay between the AC drive output (U, V, W) and the motor.

1: Valid

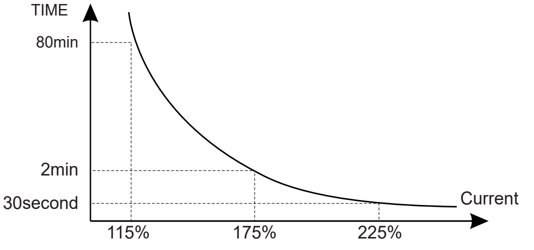
The motor overload protection function has an inverse load-time characteristics.

If the motor overload current level and overload protection time need be adjusted, modify setting of F29.03.

When motor running current reaches 225% of rated motor current and motor runs at this level for 30 seconds, E.OL2 (motor overload) is detected.

When motor running current reaches 175% of rated motor current and motor runs at this level for 2 minutes, E.OL2 (motor overload) is detected.

When motor running current reaches 115% of rated motor current and motor runs at this level for 80 minutes, E.OL2 is detected.



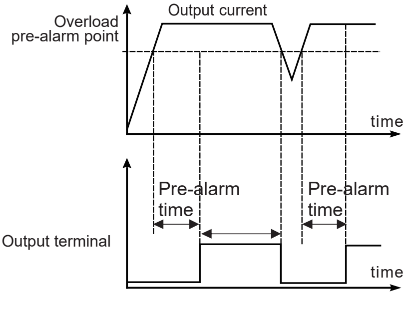
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.04	Overload pre-alarm setting	00~12	02	○	0x1D04
F29.05	Overload pre-alarm detection	50.0%~200%	150%	○	0x1D05
F29.06	Overload pre-alarm detection time	0.1s~60.0s	1.0s	○	0x1D06

F29.04 enable and define the AC drive and motor overload alarm function.

Ones: Overload pre-alarm proccessing
0: Alarm and stop freely
1: Alarm and stop according to the stop mode
2: No alarm and continue to run

Tens: Detection mode
0: Detection all the time
1: Detection in constant running

The AC drive or motor output current greater than the overload pre-alarm detection level (F29. 05), and the duration exceeds the overload warning delay time (F29. 07), the output overload warning signal.



Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.07	Motor underload protection	0~1	0	×	0x1D07

0: Invalid

1: Valid

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.08	Underload pre-alarm detection	0.0%~100%	25%	○	0x1D08
F29.09	Underload pre-alarm detection time	0.1s~60.0s	1.0s	○	0x1D09

AC drive or motor output current is less than underload pre-alarm detection level (F29.08), and the duration exceeds the overload warning delay time (F29.09), output underload warning signal(Output terminal function 10).

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.10	Underload pre-alarm proccessing	0~2	0	○	0x1D0A

F29.10 Set the action selection after inverter underload

0: Alarm and stop freely(E.LL)

1: Alarm and stop according to the stop mode (E.LL)

2: No alarm and continue to run

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.11	Fault reset times	0~20	0	○	0x1D0B

F19.11 sets permissible times of auto fault reset. If reset times exceed the value set in this parameter, the AC drive will keep fault status.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.12	Selection of DO action during auto reset	0~1	0	○	0x1D0C
F29.13	Delay time of auto reset	0.0s~100.0s	1.0s	○	0x1D0D

F29.12 decides whether digital output terminal set for fault output acts during the fault reset.

0: Not act
1: Act

F29.13 sets the delay of auto reset after the AC drive detects a fault.

Function code	Name	Setup range	Default Value	Modification	Add.
F29.14	Detection level of speed error	0.0%~50.0%	20.0%	○	0x1D0E
F29.15	Detection time of speed error	0.0:Don't detection 0.1s~60.0s	5.0s	○	0x1D0F

This function is effective only for vector control with speed sensor.

When detected motor speed is different from frequency reference and the difference is larger than the value of F29.14 for longer than the time set in F29.15, the AC drive detects E.EDU.

Function code	Name	Setup range	Default Value	Modification	Add.
F29.16	Overspeed detection level	0.0%~50.0%	20.0%	○	0x1D10
F29.17	Overspeed detection time	0.0:Don't detection 0.1s~60.0s	1.0s	○	0x1D11

These function parameters define motor overspeed detection that is effective only for vector control with speed sensor.

When detected motor speed exceeds setting frequency and the excess is larger than the value of F29.16 for longer than time set in F29.17, the AC drive detects E.STO .

If F29.17 is set to 0, motor overspeed detection is disabled.

Function code	Name	Setup range	Default Value	Modification	Add.
F29.18	Power dip ride-through function selection	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop	0	×	0x1D12
F29.19	Threshold of power dip ride-through function disabled	80.0%~100.0%	85.0%	×	0x1D13
F29.20	Judging time of bus voltage recovering from power dip	0.0s~100.0s	0.5s	×	0x1D14
F29.21	Threshold of power dip ride-through function enabled	60.0%~100.0%	80.0%	×	0x1D15

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

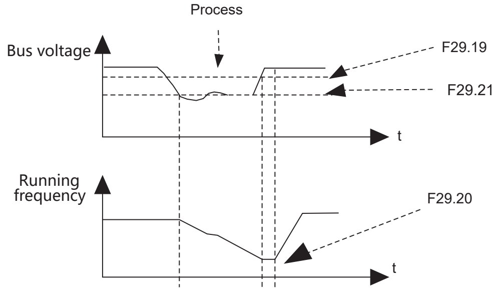
If P9-59 = 0, Invalid

If P9-59 = 1, upon instantaneous power failure or sudden voltage dip, the AC drive

decelerates. Once the bus voltage resumes to normal, the AC drive accelerates to the set frequency. If the bus voltage remains normal for the time exceeding the value set in P9-61, it is considered that the bus voltage resumes to normal.

If P9-59 = 2, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates to stop.

Figure .AC drive action diagram upon instantaneous power failure



Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F29.22	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0	○	0x1D16
F29.23	Motor overheat protection threshold	0.0~200.0°C	110°C	○	0x1D17
F29.24	Motor overheat pre-warningthreshold	0.0~200.0°C	90°C	○	0x1D18

A motor temperature sensor can be connected to AI3 and PGND on extension I/O card. This input is used by the drive for motor overheat protection.

The drive supports both PT100 and PT1000. Make sure to set sensor type correctly. You can view motor temperature in F99.33.

When input signal reaches the value set in F29.23, the AC drive detects E.PTC.

When input signal reaches the value set in F29.24, digital output terminal set for function 37 becomes on.

Group F30
User-Defined Parameters Group

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F30. 00	User-Defined Parameter 0	F00. 00~F99.XX	F00.01		0x1E00
F30. 01	User-Defined Parameter 1	F00. 00~F99.XX	F02.00		0x1E01
F30. 02	User-Defined Parameter 2	F00. 00~F99.XX	F01.00		0x1E02
F30. 03	User-Defined Parameter 3	F00. 00~F99.XX	F01.04		0x1E03
F30. 04	User-Defined Parameter 4	F00. 00~F99.XX	F01.05		0x1E04
F30. 05	User-Defined Parameter 5	F00. 00~F99.XX	F03.00		0x1E05
F30. 06	User-Defined Parameter 6	F00. 00~F99.XX	F03.01		0x1E06
F30. 07	User-Defined Parameter 7	F00. 00~F99.XX	F04.00		0x1E07
F30. 08	User-Defined Parameter 8	F00. 00~F99.XX	F04.07		0x1E08
F30. 09	User-Defined Parameter 9	F00. 00~F99.XX	F11.00		0x1E09
F30. 10	User-Defined Parameter 10	F00. 00~F99.XX	F11.01		0x1E0A
F30. 11	User-Defined Parameter 11	F00. 00~F99.XX	F11.02		0x1E0B
F30. 12	User-Defined Parameter 12	F00. 00~F99.XX	F12.03		0x1E0C
F30. 13	User-Defined Parameter 13	F00. 00~F99.XX	F15.00		0x1E0D
F30. 14	User-Defined Parameter 14	F00. 00~F99.XX	F02.03		0x1E0E
F30. 15	User-Defined Parameter 15	F00. 00~F99.XX	F02.09		0x1E0F
F30. 16	User-Defined Parameter 16	F00. 00~F99.XX	F28.00		0x1E10
F30. 17	User-Defined Parameter 17	F00. 00~F99.XX	F00.00		0x1E11
F30. 18	User-Defined Parameter 18	F00. 00~F99.XX	F00.00		0x1E12
F30. 19	User-Defined Parameter 19	F00. 00~F99.XX	F00.00		0x1E13
F30. 20	User-Defined Parameter 20	F00. 00~F99.XX	F00.00		0x1E14
F30. 21	User-Defined Parameter 21	F00. 00~F99.XX	F00.00		0x1E15
F30. 22	User-Defined Parameter 22	F00. 00~F99.XX	F00.00		0x1E16
F30. 23	User-Defined Parameter 23	F00. 00~F99.XX	F00.00		0x1E17
F30. 24	User-Defined Parameter 24	F00. 00~F99.XX	F00.00		0x1E18
F30. 25	User-Defined Parameter 25	F00. 00~F99.XX	F00.00		0x1E19
F30. 26	User-Defined Parameter 26	F00. 00~F99.XX	F00.00		0x1E1A
F30. 27	User-Defined Parameter 27	F00. 00~F99.XX	F00.00		0x1E1B

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F30. 28	User-Defined Parameter 28	F00. 00~F99.XX	F00.00		0x1E1C
F30. 29	User-Defined Parameter 29	F00. 00~F99.XX	F00.00		0x1E1D
F30. 30	User-Defined Parameter 30	F00. 00~F99.XX	F00.00		0x1E1E
F30. 31	User-Defined Parameter 31	F00. 00~F99.XX	F00.00		0x1E1F

F30.00~F30.31: This set of parameters is a user customized parameter set. Among all the parameters, the user can select the required parameters to be summarized into the F30 group as user customized parameters for easy viewing and change operations.

Long press the PRG key in the operation panel to enter the user custom parameter mode, the display parameters are defined by F30.00~F30.31. The order is the same as that of the F30 group.

Group F98
History Fault

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F98.00	Current fault type	0: No fault 1: Inverter module protection(E.OUT) 2: Current detection fault(E.ICE) 3: Short circuit to ground(E.ERH) 4: Input phase loss(E.SPI) 5:Output phase loss(E.SPO) 6: Overcurrent during acceleration(E.OC1) 7: Overcurrent during deceleration(E.OC2) 8: Overcurrent at constant speed(E.OC3) 9: Overvoltage during acceleration(E.OU1) 10: Overvoltage during deceleration(E.OU2) 11: Overvoltage at constant speed(E.OU3) 12: Undervoltage(E.LU) 13: AC drive overload(E.OL1) 14: Motor overload(E.OL2) 15: Motor overload prealarm(E.OL3) 16: Motor underload(E.LL) 17: AC drive overheated(E.OH) 18: Motor auto-tuning fault(E.TUNE) 19: EEPROM read-write fault(E.EEP) 20: External fault 1(E.EF1) 21: External fault 2(E.EF2) 22: Port communication fault(E.CE) 23: PID feedback loss(E.PID) 24: Speed feedback fault(E.EDU) 25: Imbalance fault(E.STO) 26: Encoder fault(E.ECD) 27: Motor overheated fault(E.PTC) 28: Reserve 29: Magnetic pole initial position detection falut(E.PLR) 30: Motor switchover fault during running(E.CH) 31: RESERVE	-	*	0x2200
F98.01	Previous fault type		-	*	0x2201
F98.02	Previous 2 fault type		-	*	0x2202

F98.00~F98.02 record the AC drive's fault code for the last three times

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F98.03	Running frequency at current fault	----	----	*	0x2203
F98.04	Output current at current fault	----	----	*	0x2204
F98.05	Output voltage at current fault	----	----	*	0x2205

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F98.06	Bus voltage at current fault	----	----	*	0x2206
F98.07	IGBT temperature at current fault	----	----	*	0x2207
F98.08	Input terminals state at current fault	----	----	*	0x2208
F98.09	Output terminals state at current fault	----	----	*	0x2209
F98.10	AC drive state at current fault	----	----	*	0x220A
F98.11	Power-on time at current fault	----	----	*	0x220B
F98.12	Running time at current fault	----	----	*	0x220C

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

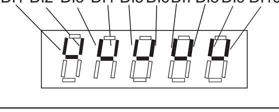
Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F98.13	Running frequency at previous fault	----	----	*	0x220D
F98.14	Output current at previous fault	----	----	*	0x220E
F98.15	Output voltage at previous fault	----	----	*	0x220F
F98.16	Bus voltage at previous fault	----	----	*	0x2210
F98.17	IGBT temperature at previous fault	----	----	*	0x2211
F98.18	Input terminals state at previous fault	----	----	*	0x2212
F98.19	Output terminals state at previous fault	----	----	*	0x2213
F98.20	AC drive state at previous fault	----	----	*	0x2214
F98.21	Power-on time at previous fault	----	----	*	0x2215
F98.22	Running time at previous fault	----	----	*	0x2216

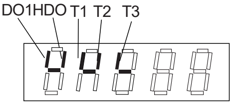
These parameters record the AC drive internal variables at previous, the record of the input and output variables, referring to the function code specific display.

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F98.23	Running frequency at previous 2 fault	----	----	*	0x2217
F98.24	Output current at previous 2 fault	----	----	*	0x2218
F98.25	Output voltage at previous 2 fault	----	----	*	0x2219
F98.26	Bus voltage at previous 2 fault	----	----	*	0x221A
F98.27	IGBT temperature at previous 2 fault	----	----	*	0x221B
F98.28	Input terminals state at previous 2 fault	----	----	*	0x221C
F98.29	Output terminals state at previous 2 fault	----	----	*	0x221D
F98.30	AC drive state at previous 2 fault	----	----	*	0x221E
F98.31	Power-on time at previous 2 fault	----	----	*	0x221F
F98.32	Running time at previous 2 fault	----	----	*	0x2220

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

Group F99
Monitoring Function Group

Function code	Name	Setup range	Default Value	Modification	Add.
F99.00	Output frequency	0.00Hz~F01.08(Upper limit Freq)	----	*	0x2100
F99.01	Setting frequency	0.00Hz~F01.08(Upper limit Freq)	----	*	0x2101
F99.02	Output current	0.01~5000.0A	----	*	0x2102
F99.03	Motor speed	0~65535rpm	----	*	0x2103
F99.04	Load speed display	0~65535	----	*	0x2104
F99.05	Output power	0.1~6553.5KW	----	*	0x2105
F99.06	Output torque	-300.0%~300.0%	----	*	0x2106
F99.07	Output voltage	0~1000V	----	*	0x2107
F99.08	DC bus voltage	0.0~2000.0V	----	*	0x2108
F99.09	AC input voltage	0.0~2000.0V	----	*	0x2109
F99.10	AC drive status	1: Forward 2: Reverse 3: Forward Jogging 4: Reverse Jogging 5: AC drive Fault 6: Under-voltage 7: AC drive stop	----	*	0x210A
F99.11	Fault information	0~33(Corresponding to F98.00)	----	*	0x210B
F99.12	AI1 input voltage	0.00~10.00V	----	*	0x210C
F99.13	AI2 input voltage	0.00~10.00V	----	*	0x210D
F99.14	AI3 input voltage	0.00~10.00V	----	*	0x210E
F99.15	AO1 output voltage	0.00~10.00V	----	*	0x210F
F99.16	AO2 output voltage	0.00~10.00V	----	*	0x2110
F99.17	DI state	0x00~0xFFF	----	*	0x2111
F99.18	DI state display	The state of each function end is indicated by the on-off of the specified section of the LED digital tube. The on-off of the digital tube segment means that the corresponding terminal state is valid, while the off-off means that the corresponding terminal state is invalid.  	----	*	0x2112

Function code	Name	Setup range	Default Value	Modifi-cation	Add.
F99.19	DO state	0x00~0xFFF	----	*	0x2113
F99.20	DO state display	Same as F99. 18. 	----	*	0x2114
F99.21	Di5 pulse frequency	0.01~100.00kHz	----	*	0x2115
F99.22	HDO output frequency	0.01~100.00kHz	----	*	0x2116
F99.23	PID reference	0~65000	----	*	0x2117
F99.24	PID feedback	0~65000	----	*	0x2118
F99.25	Counting value	0~65535	----	*	0x2119
F99.26	Length value	0~65535	----	*	0x211A
F99.27	Linear speed	0~65535	----	*	0x211B
F99.28	Target torque	-300.0%~300.0%	----	*	0x211C
F99.29	Remaining running time	0.1Min~6553.5Min	----	*	0x211D
F99.30	PLC step	0~15	----	*	0x211E
F99.31	Feedback frequency	0. 01Hz~F01. 07(MAX. Freq)	----	*	0x211F
F99.32	Feedback speed of encode	0. 01Hz~F01. 07(MAX. Freq)	----	*	0x2120
F99.33	Motor temperature	1~200℃	----	*	0x2121
F99.34	AC drive temperature	-30~200℃	----	*	0x2122
F99.35	Current Power-on time	1Min~65535Min	----	*	0x2123
F99.36	Current Running time	0.1Min~6553.5Min	----	*	0x2124
F99.37	G/P type	0: G type 1: P type	----	*	0x2125
F99.38	AC drive power	0.7~500.0KW	----	*	0x2126
F99.39	Motor seletion	1: Motor 1 2: Motor 2	----	*	0x2127
F99.40	Accumulative power-on time	1Min~65535Min	----	*	0x2128
F99.41	Accumulative running time	0.1Min~6553.5Min	----	*	0x2129

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 1000 V, intended for use in the first environment.

5. Category C2 AC drive:

PDS of rated voltage less than 1000 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. 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

The 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

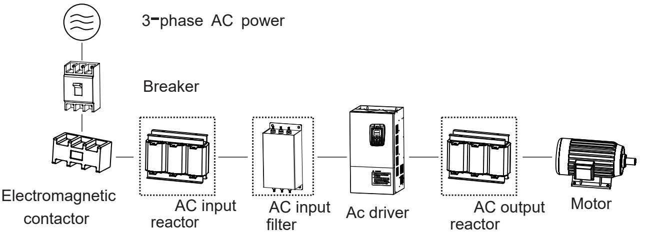


Figure7-1 EMC external fittings installation diagram

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 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 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)
KM600-4T-18.5G	50EBK5 FN 3258	55
KM600-4T-22G	65EBK5 FN 3258	75
KM600-4T-30G	65EBK5 FN 3258	75
KM600-4T-37G	80EBK5 FN 3258	100
KM600-4T-45G	100EBK5 FN 3258	100
KM600-4T-55G	130EBK5 FN 3258	130
KM600-4T-75G	160EBK5 FN 3258	180
KM600-4T-90G	200EBK5 FN 3258	180
KM600-4T-110G	250EBK5 FN 3270H	250

7.3.1 .2 Simple Filter

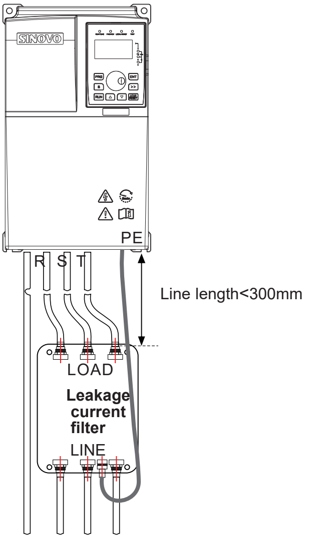


Figure7-2 Simple filter installation diagram

Simple Filter Selection Table

AC drive Model	Input Simple Filter Model	Filter Rated Current A	Outline Dimension Dx Wx H(mm)	Installation DimensionDxW(mm)
KM600-4T-18.5G	DL65EB1/10	65	218x140x80	184x112
KM600-4T-22G				
KM600-4T-30G				

AC drive Model	Input Simple Filter Model	Filter Rated Current A	Outline Dimension Dx Wx H(mm)	Installation DimensionDxW(mm)
KM600-4T-37G	DL-120EB1/10	120	334x185x90	304x155
KM600-4T-45G				
KM600-4T-55G				
KM600-4T-75G	DL-180EB1/10	180	388x220x100	354x190
KM600-4T-90G				
KM600-4T-110G	Without			

Simple filter outline and installation dimension as follow:

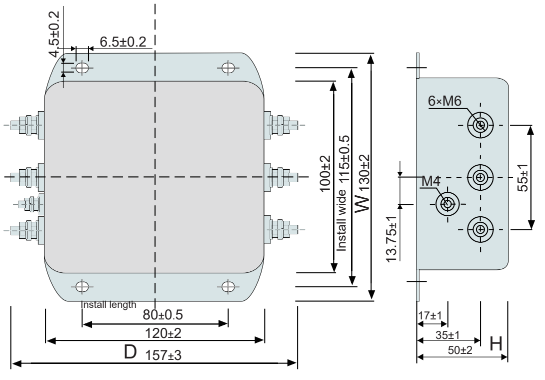


Figure 7-3 Simple Filter Outline and Installation Dimension Figure

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
KM600-4T-18.5G	SD-ACL-50-4T-183-2%	50
KM600-4T-22G	SD-ACL-80-4T-303-2%	80
KM600-4T-30G	SD-ACL-80-4T-303-2%	80
KM600-4T-37G	SD-ACL-80-4T-303-2%	80
KM600-4T-45G	SD-ACL-120-4T-453-2%	120
KM600-4T-55G	SD-ACL-120-4T-453-2%	120
KM600-4T-75G	SD-ACL-200-4T-753-2%	200
KM600-4T-90G	SD-ACL-200-4T-753-2%	200
KM600-4T-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 Input Current A
KM600-4T-18.5G	SD-OCL-50-4T-183-1%	50
KM600-4T-22G	SD-OCL-60-4T-223-1%	80
KM600-4T-30G	SD-OCL-80-4T-303-1%	80
KM600-4T-37G	SD-OCL-90-4T-373-1%	90
KM600-4T-45G	SD-OCL-120-4T-453-1%	120
KM600-4T-55G	SD-OCL-150-4T-553-1%	150
KM600-4T-75G	SD-OCL-200-4T-753-1%	200
KM600-4T-90G	SD-OCL-250-4T-114-1%	250
KM600-4T-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:

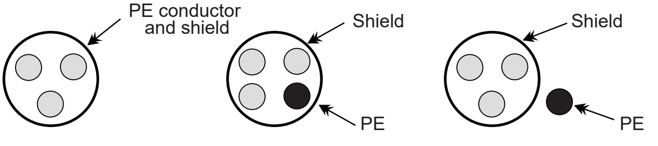


Figure 7-5 Shielded cable with shielding

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.

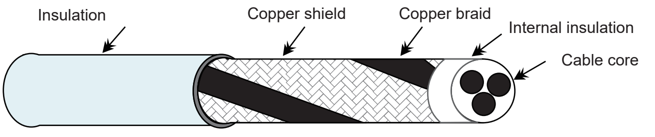
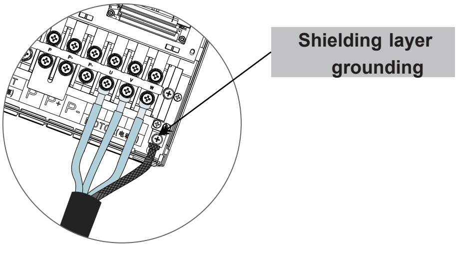


Figure 7-6 Shielded cable with shielding

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

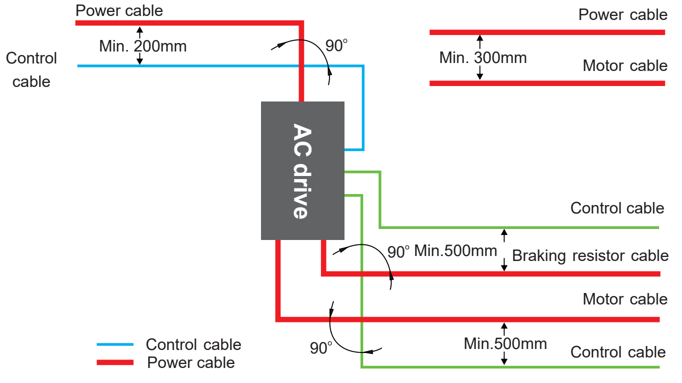
output voltage of the AC drive, the motor cables and other cables must not be laid side by side for a long distance.

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.

KAMAN

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 TRIP 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 F98.00~F98.02 store 3 recent faults. Function codes F98.03~F98.12, F98.13~F98.22 ,F98.23~F98.32 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	IGBT 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.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.
3	E.ERH	Grounding shortcut fault	♦ 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.
4	E.SPI	Input phase loss	♦ Phase loss or fluctuation of input R,S,T.	♦ Check input power
5	E.SPO	Output phase loss	♦ U,V,W phase loss input (or serious asymmetrical three phase of the load)	♦ Check input power
6	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.
7	E.OC 2	Decelerating overcurrent		
8	E.OC 3	Constant overcurrent		
9	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.
10	E.OU 2	Decelerating overvoltage		
11	E.OU 3	Constant overvoltage		
12	E.LU	Under-voltage fault	♦ The voltage of the power supply is too low.	♦ Check the input power of the supply line.
13	E.OL1	AC drive 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.

No.	Code	Fault	Cause	Solution
14	E.OL2	Motor overload	♦ The voltage of the power supply is too low.	♦ Check the input power of the supply line.
15	E.oL3	Motor overload prealarm	♦ The AC drive will report the over-load pre-alarm according to the set value.	♦ Check the load and the overload pre-alarm point.
16	E.LL	Motor underload fault	♦ The AC drive will report the unde-rload pre-alarm according to the set value.	♦ Check the load and the underload pre-alarm point.
17	E.OH	AC drive overheated	♦ Air duct jam or fan damage. ♦ Ambient temperature is too high. ♦ The time of overload running is too long	♦ Lower the ambient temperature. ♦ Clean the ventilation. ♦ Replace the cooling fan. ♦ Replace the damaged thermally sensitive resistor. ♦ Replace the AC Drive IGBT.
18	E.TUE	Motor-autotuning fault	♦ The motor capacity does not com-ply with the AC drive capability. ♦ The rated parameter of the motor does not set correctly. ♦ The offset between the paramet-ers from autotune and the stand-ard parameter is huge. ♦ Autotune overtime.	♦ Check the connector and repatch. ♦ Change the hoare. ♦ Change the main panel.
19	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.
20	E.EF1	User-defined fault 1	User-defined fault 1 is input via DI.	Reset the operation.
21	E.EF2	User-defined fault 2	User-defined fault 2 is input via DI.	Reset the operation.
22	E.CE	Communication fault	♦ The baud rate setting is incorrect. ♦ Fault occurs to the communica-tion 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-interfere-nce capability.
23	E.PID	PID feedback outline fault	♦ PID feedback offline. ♦ PID feedback source disappear.	♦ Check the PID feedback signal. ♦ Check the PID feedback source.
24	E.EDU	Speed deviation fault	♦ Encoder parameters are set improperly. ♦ Motor auto-tuning is not performed. ♦ F29. 14 (detection level of speed error) and F29. 15 (detection time of speed error) are setincorrectly.	♦ Set encoder parameters properly. ♦ Perform motor auto-tuning. ♦ Set F29.14 and F29.15 correctly based on actual condition.

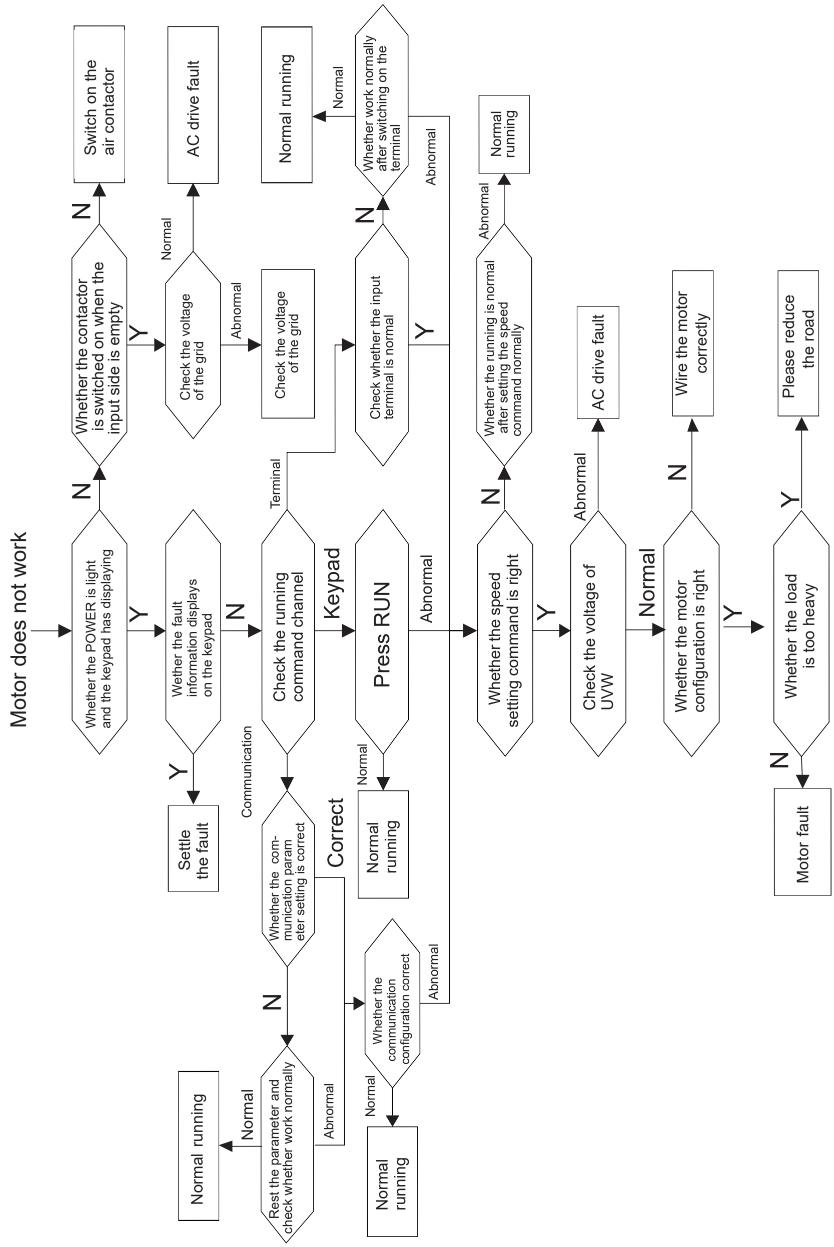
No.	Code	Fault	Cause	Solution
25	E.STO	Maladjustment fault	♦The control parameters of the synchronous motors not set properly. ♦ The autoturn parameter is not right. ♦ The AC drive is not connected to the motor.	♦ Check the load and ensure it is normal. ♦ Check whether the control parameter is set properly or not. ♦ Increase the maladjustment detection time.
26	E.ECD	Encoder fault	♦ Encoder is not matched. ♦ Encoder wiring is incorrect. ♦ Encoder is damaged. ♦ PG card is abnormal.	♦ Set the type of encoder correctly. ♦ Check the PG card power supply and phase sequence. ♦ Replace encoder. ♦ Replace PG card.
27	E.PTC	Motor overheat	♦ Cable connection of temperature sensorbecomes loose ♦ The motor temperature is too high.	♦ Check cable connection of temperature sensor. ♦ Check cable connection of temperature sensor.
28	RESERVE			
29	E.PLR	Motor overheat		
30	E.CH	Motor switchover fault	Motor switchover via terminal during drive running of the AC drive	Perform motor switchover after the AC drive stops

Error copying keyboard parameters

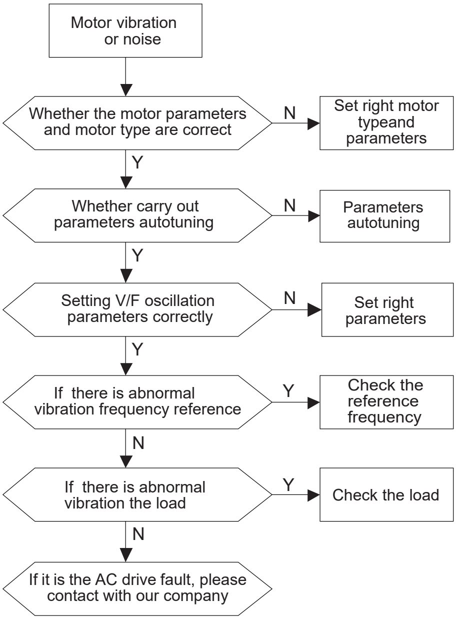
CODE	Fault	Cause	Solution
EC1	Failed to read control board parameters	1. Keyboard cable contact is bad or broken 2. Keyboard cables are too long or have strong interference	1. Check the environment and exclude interference sources 2.Ask for technical support
EC2	Failed to write control board parameters	1. Keyboard cable contact is bad or broken 2. Keyboard cables are too long or have strong interference 3. Copy the parameters when the converter is running	1. Check the environment and exclude interference sources 2.Ask for technical support 3. Carry out copy operation in the state of shutdown
EC3	Keyboard EEP read/write error	1. Keyboard cable contact is bad or broken 2. Keyboard cables are too long or have strong interference 3. Whether the keyboard hardware is damaged	1. Check the environment and exclude interference sources 2.Ask for technical support
EC4			
EC5	The keyboard is stored empty	1. Whether the keyboard storage is empty	1. Upload parameters to keyboard
EC6	Software version error	1. Whether the parameters stored on the keyboard are consistent with the software version of the parameters on the control board	1. The keyboard storage is consistent with the software version of the control board parameters before downloading

8.8 Common Fault Analysis

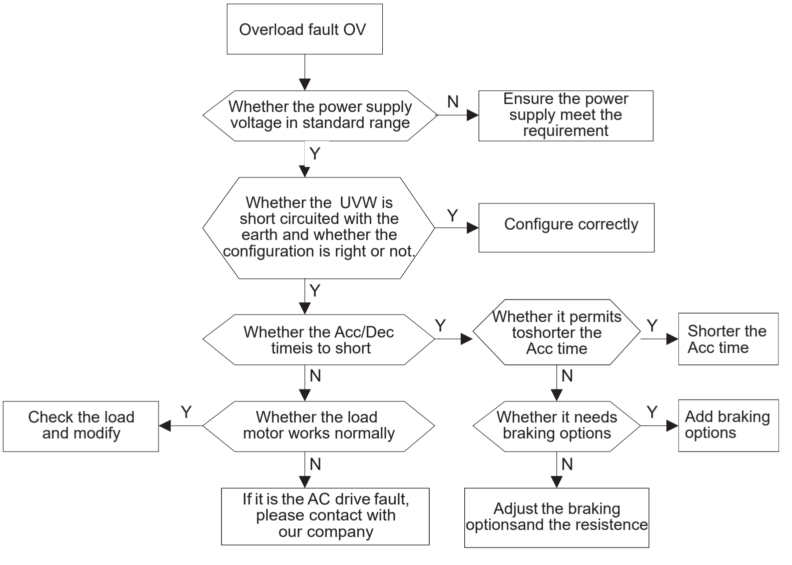
8.8.1 The Motor does not Work



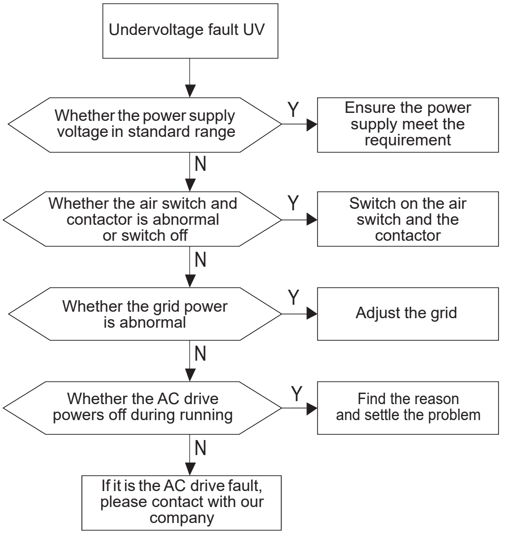
8.8.2 Motor Vibration



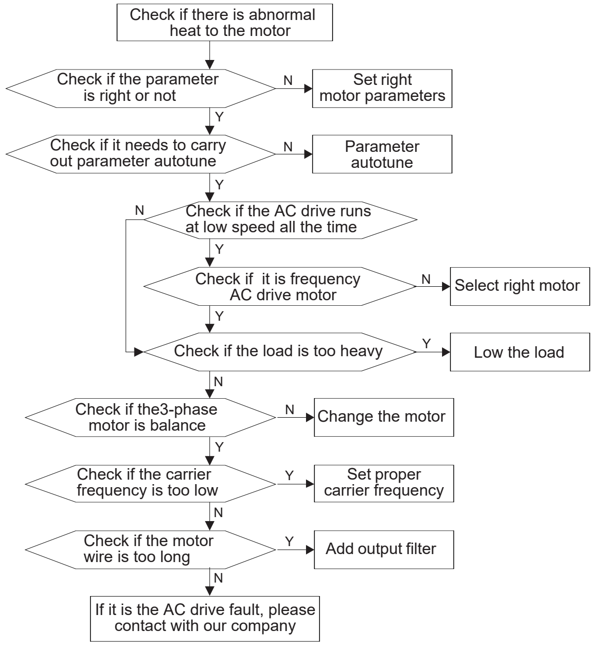
8.8.3 Overvoltage



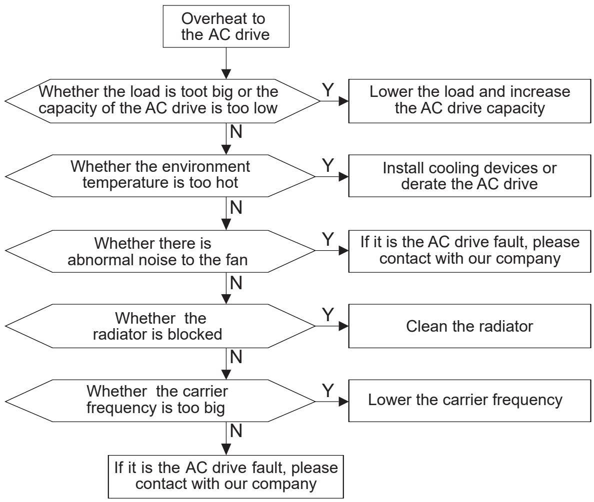
8.8.4 Undervoltage Fault



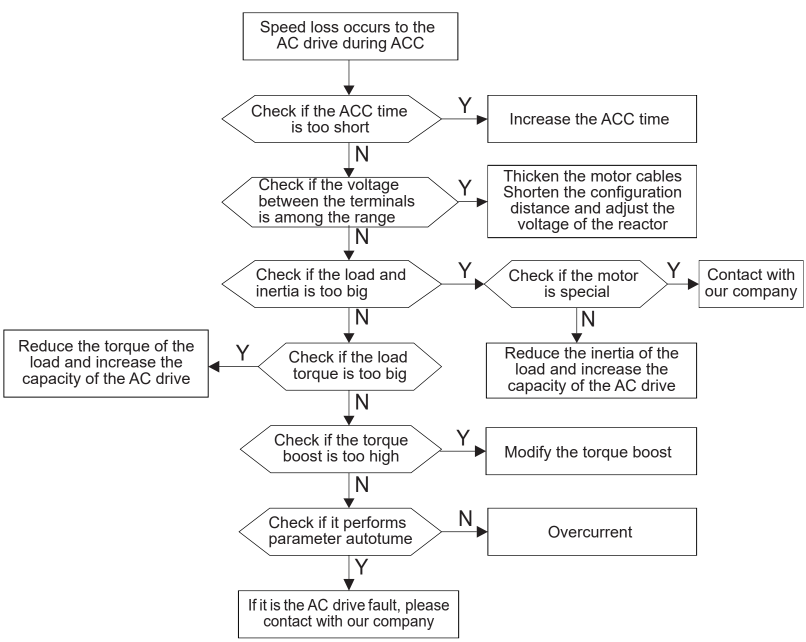
8.8.5 Abnormal Heating of the Motor



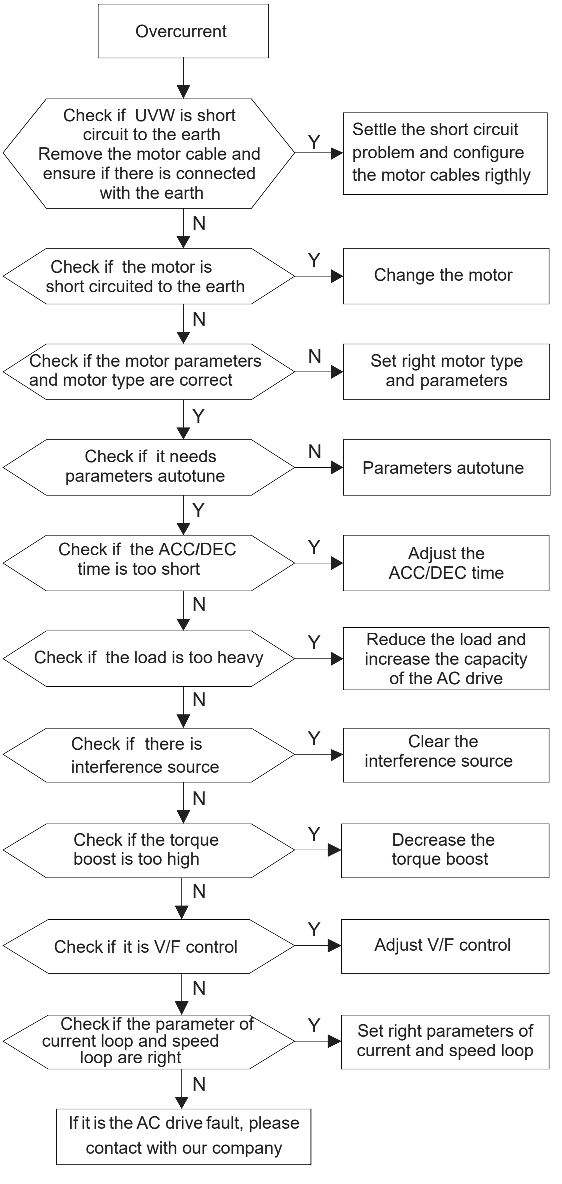
8.8.6 Overheat of the AC drive



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.

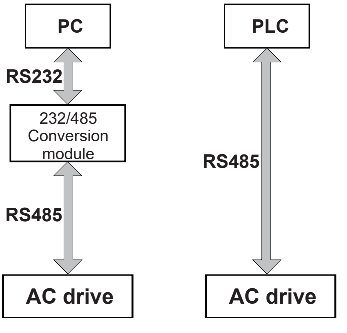


Figure 9-1 Single host/slave networking way

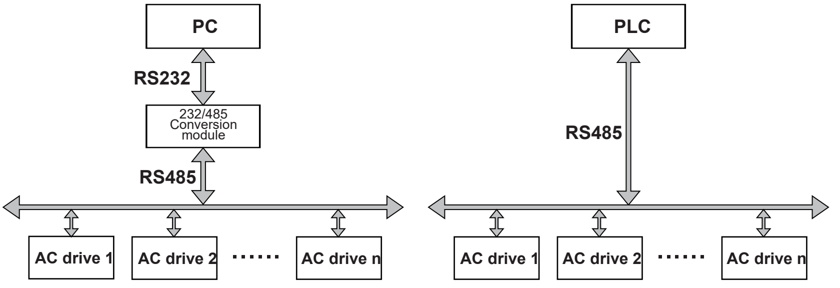


Figure 9-2 Single host/Multiple slaves networking way

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.

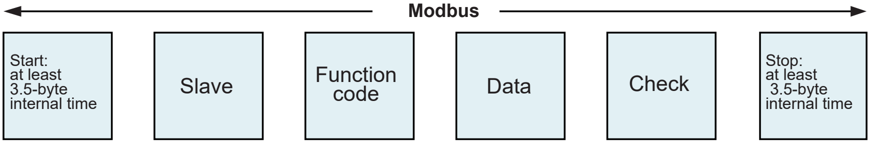
9.3 Protocol Frame Format

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.
		Slave received the function of the write operation parameters as read-only
		Slave in operation of the received write operation functions do not modify the parameters in running
		Slave is busy,ttis mainly occurs when data is stored in memory

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-F99;   Low byte: 00-FF

For example, to access F01.12, the access address of the parameter is 0x010C.

Function code group	Absolute Add.	Function code group	Absolute Add.
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
F10 Group	0x0A	F11 Group	0x0B
F12 Group	0x0C	F13 Group	0x0D
F14 Group	0x0E	F15 Group	0x0F
F16 Group	0x10	F18 Group	0x12
F19 Group	0x13	F20 Group	0x14
F21 Group	0x15	F28 Group	0x1C
F29 Group	0x1D	F30 Group	0x1E
F98 Group	0x22	F99 Group	0x21

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, simply add 0X40 to all high bytes in the table.

For example:

The parameter F01.12 is stored in EEPROM , and the address is represented as 0x010C;

The parameter F01.12 is not stored in the EEPROM, and the address is represented as 0x410C;

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 Status parameters

Add.	Number	Setting instruction	R/W
2100H	F99.99	Output frequency	R
2101H	F99.01	Setting frequency	W/R
2102H	F99.02	Output current	R
210AH	F99.10	AC drive status 1: Forward running 2: Reverse running 3: Forward jogging 4: Reverse jogging 5: AC drive fault 6: Under-voltage status 7: AC drive stop	R
210BH	F99.11	0~10000 0: No fault 1: IGBT protection 2: Current detecting fault 3: Grounding shortcut fault 4: Input phase loss 5: Output phase loss 6: Accelerating over-current 7: Decelerating over-current 8: Constant over-current 9: Accelerating over-voltage 10: Decelerating over-voltage 11: Constant over-voltage 12: Under-voltage fault 13: AC drive overload 14: Motor overload 15: Motor overload prealarm 16: Motor underload fault 17: AC drive overheat 18: Motor autotuning fault 19: EEPROM operation fault 20: User-defined fault 1 21: User-defined fault 2 22: Communication fault 23: PID feedback outline fault 24: Speed deviation fault 25: Maladjustment fault 26: Encoder fault 27: Motor overheat	R
2117H	F99.23	PID reference	W/R
2118H	F99.24	PID feedback	W/R
. . .	. . .	. . .	R

9.5.3 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	W
Setting register	Setting frequency	2001H	-10000~10000 (Corresponding to -200.0%~200.0%	W
	Forward upper limit frequency	2002H	0~10000 Correspond to 0.0Hz~F01.07(Max. Freq)	W
	Reverse upper limit frequency	2003H	0~10000 Correspond to 0.0Hz~F01.07(Max. Freq)	W
	Electric torque upper limit value	2004H	0~10000	W
	Brake torque upper limit value	2005H	0~10000	W
	Voltage setting on V/f separated pattern	2006H	0~1000 (Corresponding to 0~Motor rated voltage)	W
	DO control	2007H	0~0X000F	W
	AO1 control	2008H	0~0X7FFF	W
	AO2 control	2009H	0~0X7FFF	W
	HDO control	200AH	0~0X7FFF	W

Note:
1. R is read-only, invalid write and error reporting address;
2. W for write only, invalid read and error reporting address.