8000B Series Inverter

User Manual

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Preface

First of all, thank you for purchasing 8000B Series Enhanced AC Drive!

This user manual introduces how to use 8000B series variable frequency drives (VFDs) properly. Please read this user manual carefully before carrying out works such as installation, commissioning, maintenance, etc.

Improper usage of VFDs would result in unpredictable accident, please deliver this user manual to your end user. At the same time, please use VFDs until completely understands safety instructions.

Attentions:

Illustrations in this user manual are for the convenience of understanding by user, and it might be a bit different to the product you have purchased. As most of the illustrations are showing the condition of VFD product with cover or safety guard removed, please note that cover or safety guard must be installed back as required, then operate strictly according to this user manual.

WECON always continually improve the products, all technical parameters are subject to change without notice. It would be possible that the old version manual is inconformity to the new products you received. Please always use the user manual which is included in the same package of product. If the user manual is lost or damaged, or there are problems or doughts, please ring the hotline of service center of WECON Company on +86-591-87868869.

CONTENTS

SAFETY INSTRUCTION

Read this user manual thoroughly before installation, operation, maintenance or inspection of the variable frequency drive (VFD). In this manual, safety instructions are classified as “WARNING” or “CAUTION”.

⚠ WARNING: Indicate a potentially dangerous situation which, if not avoided, can result in death or serious injury to personnel.

⚠CAUTION: Indicate a potentially dangerous situation which, if not avoided, can result in minor or moderate injury and damage to equipment. It may also be used for warning against unsafe practices.

Even items described as (⚠CAUTION) may result in a vital accident in some situations. Please follow these important notes:

■ Checking Before installation

⚠
◎Do not install or operate any VFD that is damaged or has missing parts. Failing to follow this rule can result in facility damage or severe injury.

■ Installation

⚠
◎When installing or handling the VFD, please hold the bottom of the product otherwise its case only, thus prevent its falling and being damaged. ◎Install the VFD on nonflammable material like metal, and keep away from flammable or explsive object, heat source, and such environment. Otherwise it may cause a fire. ◎Make sure that the mounting environment free of metal dust. Otherwise it may cause damage to the VFD. ◎When VFDs is installed inside an electrical cabinet or other kind of enclosure, please install fans or other cooling devices, and keep ventilation well enough to ensure the enclosure temperature below 40℃, or the VFD may be damaged due to extreme high rise of temperature.

■ Wiring

◎Ensure only qualified electrical engineering personnel for wiring work . Otherwise it can cause an electrical shock or damage to the VFD.
◎Make sure VFD is isolated from power supply by the circuit breaker. Otherwise it may cause electrical shock or a fire.
◎Make sure that the ground terminal is grounded correctly. Otherwise it may cause an electrical shock.
◎Do not touch the main circuit terminals, and keep the wiring of VFD main terminals from contacting to the enclosure, or it can cause electrical shock.
◎Terminals for brake resistor are (+) and PB. Do not wire to other terminals, otherwise will cause a fire.

◎Before wiring, ensure the VFD's rated input voltage and phases is compatible to the input power source, or it can cause a fire or personal injury.
◎Never connect the AC power supply to output terminals U, V and W. Otherwise the VFD will be damaged and the guarantee is voided.
◎Never carry out withstand voltage test to the VFD, for example by a megohm meter. Otherwise it may cause damage to the VFD.
◎VFDuse damage to the t guand control circuit wiring should be separated, or run vertically from each other. Otherwise it may cause interference to the control signals.
◎Main circuit wiring cable leads should be crimped with cable lugs in insulated sleeve.
◎If the cable length between the VFD and the motor is greater than 50 meters, it is recommended to use an output reactor to protect the VFD and the motor.

■ Operating

◎It is only allowed to power on the VFD after the wirng is finished and its cover is reinstalled. It is strictly prohibit to remove the cover of VFD while power is on, otherwise it may cause electric shock.

◎Before programming a VFD with fault auto reset or restart option after power off, the mechanical device need to be implemented with safety measures first, otherwise it can lead to personal injury.

◎"STOP/RESET" key may become invalid as a result of some function setting. It is recommended to install an independent emergency circuit breaker for the VFD control system, otherwise it may result in personal injury.

◎When the power is on, the VFD's terminals may have electricity also even if it is in stop mode. Do not touch U, V, W terminals and motor connection terminals. Otherwise it may cause an electrical shock.

◎Do not use a magnetic contactor to control the start and stop of the VFD. Otherwise it may cause the VFD to be damaged.

◎Before starting, please make sure that the motor and mechanical device can be run with the VFD's accelerating time setting in their safe range. Otherwise may result in device damage.

◎Do not touch the heat sink or braking resistor. Otherwise it may cause harmful burns to the body.

◎Never modify the parameters casually in unnecessary conditions, as the VFD's default parameter setting has already meet the requirements of most mechanical devices. Even if some devices have special requirements, it is only needed to modify some necessary parameters. Otherwise, it may cause device damage by improper parameter modification.

■ Maintenance

◎Never touch the VFD the connection terminals when power is on. Otherwise it may cause an electrical shock.
◎Only qualified electrical engineering personnal can be authorized to do the jobs of maintenance, checking, or parts replacement.
◎After the power supply is OFF, make sure the charge LED is OFF , the residual voltage is not exist, or wait at least 10 minutes, before carrying out maintenance or inspection. Otherwise it may cause damage or injury.

◎PCB has CMOS integrated circuit parts, never touch with bare hand, or static electricity may cause damage to the PCB.

■ Other

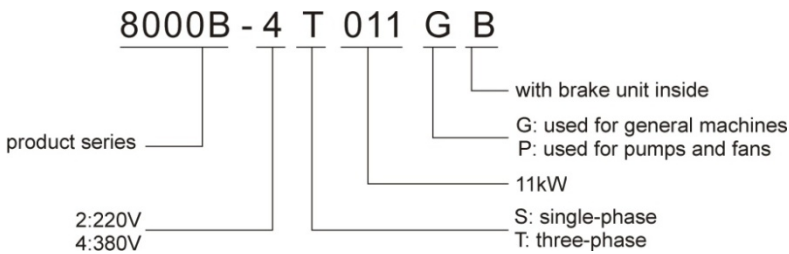
◎Modification to the VFD without permission is strictly prohibited, otherwise can cause severe injury. Arbitrarily modification of VFD will result in service guarantee voided.

Manual Conventions

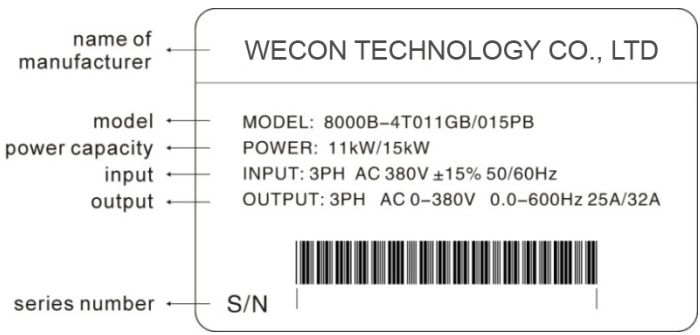
In this manual we refer to 8000B Series Variable Frequency Drives as: drive, inverter, VFD, 8000B, 8000B drive, AC drive or 8000B Series Enhanced AC Drive.

Chapter 1 Introduction to the 8000B series VFD

1.1 Model Description



1.2 Namplate Example



1.3 Table of 8000B series Drives

Drive Model G/P	Rated Output Power kW	Rated Input Current A	Rated Output Current A	Motor Power kW G/P
Single-phase 220V±15%				
8000B-2SR75GB	0.75	8.2	4.5	0.75
8000B-2S1R5GB	1.5	14.2	7	1.5
8000B-2S2R2GB	2.2	23	10	2.2
Three-phase 380V±15%				
8000B-4TR75GB	0.75	3.4	2.5	0.75
8000B-4T1R5GB	1.5	5	3.7	1.5
8000B-4T2R2GB	2.2	5.8	5.0	2.2
8000B-4T004GB/4T5R5PB	4/5.5	10/15	9/13	4/5.5
8000B-4T5R5GB/4T7R5PB	5.5/7.5	15/20	13/17	5.5/7.5
8000B-4T7R5GB	7.5	20	17	7.5
8000B-4T011GB/4T015PB	11/15	26/35	25/32	11/15
8000B-4T015GB/4T18R5PB	15/18.5	35/38	32/37	15/18.5
8000B-4T18R5GB	18.5	38	37	18.5
8000B-4T022G/4T030P	22/30	46/62	45/60	22/30
8000B-4T030G/4T037P	30/37	62/76	60/75	30/37
8000B-4T037G	37	76	75	37
8000B-4T045G/4T055P	45/55	90/105	90/110	45/55
8000B-4T055G/4T075P	55/75	105/140	110/150	55/75
8000B-4T075G/4T093P	75/93	140/160	150/176	75/93
8000B-4T093G/4T110P	93/110	160/210	176/210	93/110
8000B-4T110G	110	210	210	110
8000B-4T132G/4T160P	132/160	240/290	250/300	132/160
8000B-4T160G/4T185P	160/185	290/330	300/340	160/185
8000B-4T185G	185	330	340	185
8000B-4T200G/4T220P	200/220	370/410	380/415	200/220
8000B-4T220G/4T250P	220/250	410/460	415/470	220/250

8000B-4T250G/4T280P	250/280	460/500	470/520	250/280
8000B-4T280G/4T315P	280/315	500/580	520/600	280/315
8000B-4T315G	315	580	600	315
8000B-4T350G	350	620	640	350
8000B-4T400G	400	670	690	400

1.4 Specifications

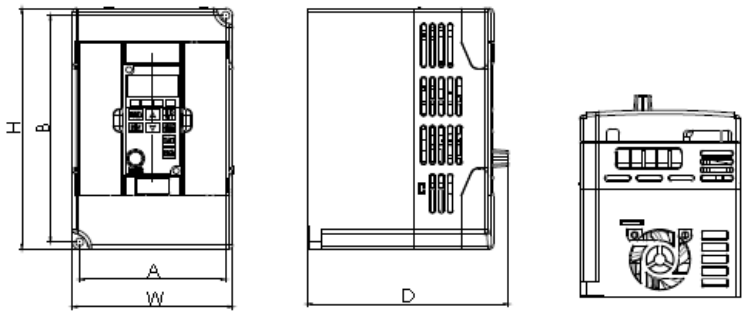
Control Characteristics		
Control Mode	SVC(Sensorless vector control)	V/F control
Starting Torque	0.5Hz 150%	0.5Hz 100%
Speed Control Range	1:100	1:20
Precision of Speed Regulation	±0.5%	±1.0%
Overload Capacities	Model G: 60 seconds at 150% rated current; one second at 180% rated current. Model P: 60 seconds at 120% rated current; one second at 150% rated current.	
V/F Curve Options	Three options: Linear, Square and Multipoint.	
DC Injection Braking Function	Braking start frequency:0.00~Max. frequency limit; Braking time:0.1~50.0s; Braking current:0 ~150% of rated current(model G); 0~100% of rated current(model P); Braking start waiting time:0.0~50.0s.	
Jog Operation	Jog frequency range:0.00-max.frequency; Accel./Decel. time of jog operation:0.1~3600s.	
Accel./Decel. Time	Accel./Decel. time range:0.1~3600s	
Torque Boosting	Manual setting:0.1~30.0%; Automatic setting:0.0	
Input & Output Characteristics		
Start Frequency	0.01~10Hz	

Rated Input Voltage	220V/380V ± 15%
Rated Input Frequency	50/60Hz,fluctuation range:±5%
Frequency Reference Resolution	Analog signals:max. frequency × 0.1%; Digital setting:0.01Hz
Output Voltage	0:rated input voltage
Output Frequency Range	0.00~600Hz
Peripheral I/O Characteristics	
Digital Input Terminals	6 inputs (programmable)
Analog Input Terminals	AVI:0~10V; ACI:0~10V or 0/4～20mA
Relay Output	1 relay output (programmable)
Open Collector Output	1 channel (programmable)
Analog Output	0.75~2.2kW: FM:0~10V; AM:0/4~20mA 4~400kW: FM:0~10V; AM:0~10V / 0/4~20mA
Basic Functions	
Operating Command Channels	Three channels:keyboard, control input terminals, serial communication interface. These channels can be switched by several methods.
Frequency References	Total 8 references including panel potential meter, UP/DOWN key digital setting, communication and PID control, etc.
Auxiliary Frequency Reference	Total 2 auxiliary frequency references, can be used in frequency combination or adjustment,
Multi-step speed & Simple PLC Function	16 steps multi-step speed control can be carried out by control input terminals or built-in simple PLC function.
Built-in PID Function	Closed loop control of system variables such as pressure, speed or temperature can be carried out by a built-in Proportional + Integral + Derivative (PID) controller.
Swing Frequency Function	Suitable for some textile and chemical fiber machines by programmble controlling of the triangular frequency references.
AVR Function	Automatic Voltage Regulation(AVR), automatically keep the output

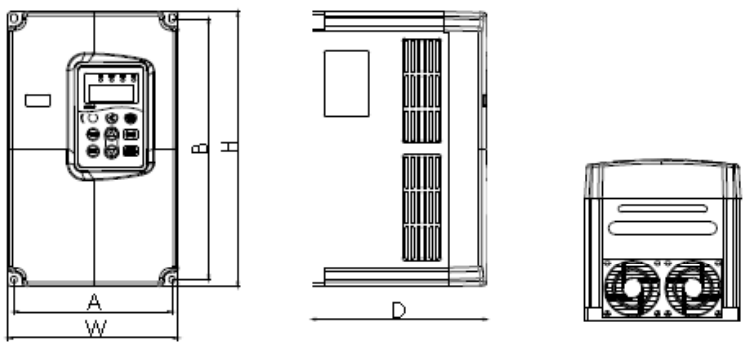
	voltage constant when power supply is not stable.
Stall Prevention	Stall Prevention automatically control the decelerating procedure by monitoring the bus voltage and prevent overvoltage fault caused by high inertia or rapid deceleration.
Communication Function	RS485 communication with standard modbus protocol.
Automatic Energy Saving Control	Automatic decrease output voltage while in the situation of light load, to achive efficient energy saving.
Fault Protection Function	Over- cur rent , over vol tage, under- vol tage, over temperature, lack of phase, etc.
Personalized function	
LED Display	16 parameters can by displayed including running frequency, DC bus voltage, output voltage, output current, etc.
Password Setting	Four-digits non zero password can be set and become effective after exit the password programming mode and wait 1 minute.
Parameter Lock Function	This function can be used to lock the parameter when running or stop in order to avoid wrong operation.
Application Environment	
Efficiency	At rated power ≥ 93% as 45kW and below； ≥ 95% as 55kW and above。
Location	Indoor away from sunlight, dust, corrosive gas, oil fog, driping water or condensation.
Elevation	1000m or less
Ambient Temperature	-10℃ ~+40℃
Humidity	95% RH or less
Vibration	< 5.9 m/s^2 (0.6G)

1.5 Dimensions and Sizes

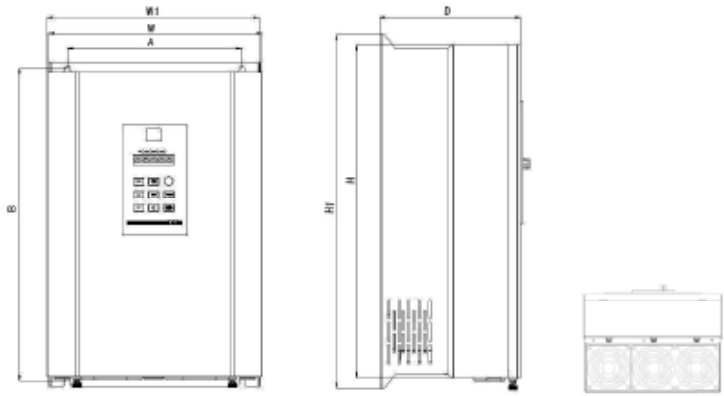
Dimensions Drawing



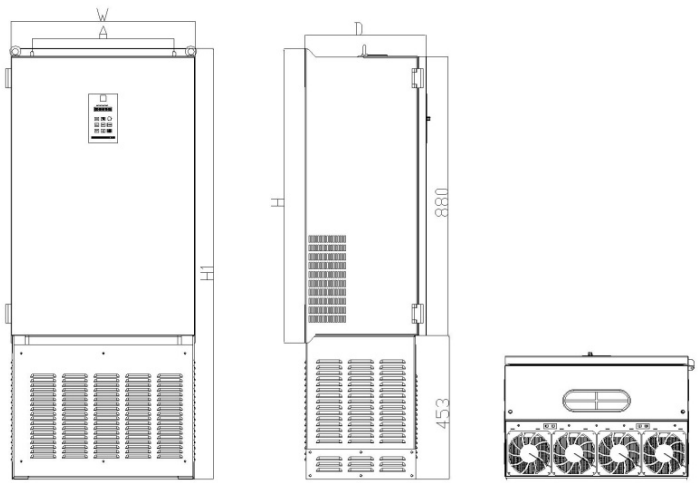
0.75kW~2.2kW (model G)



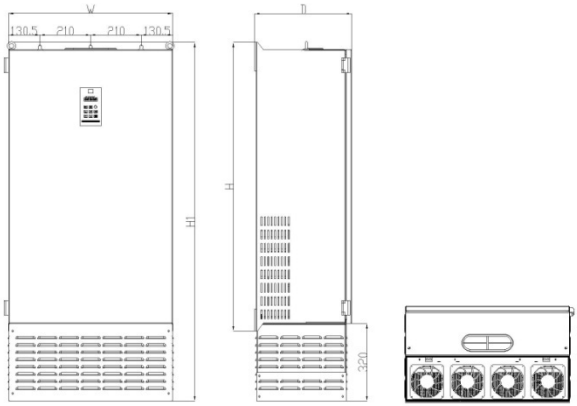
4kW~7.5kW (model G)



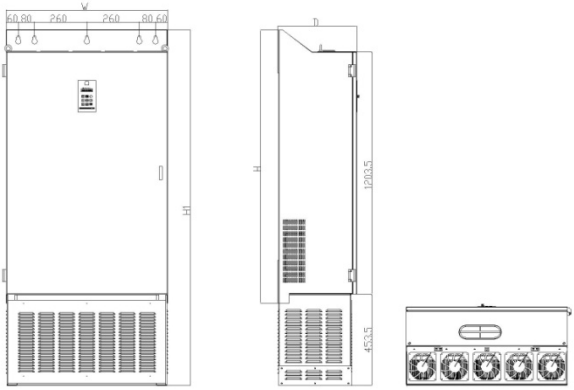
11kW~110kW (model G)



132kW~185kW (model G)



200kW~250kW (model G)

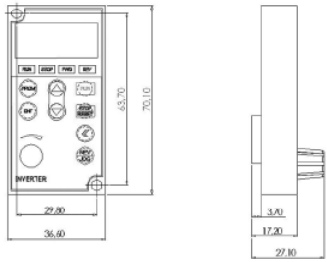


280kW~400kW (model G)

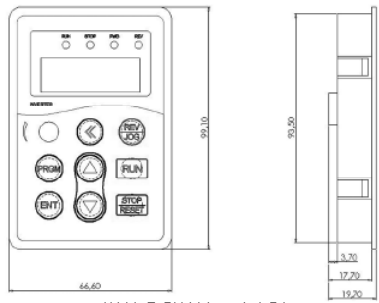
1.6 Model Size & Dimensions Table

Inverter Model	Installation Dimensions (mm)		Appearance Dimensions (mm)					Hole Diameter (mm)
	A	B	H	H1	W	W1	D	
8000B-2SR75GB	92	142.7	151.7		101		126.8	ø5
8000B-2S1R5GB								
8000B-2S2R2GB								
8000B-4TR75GB	92	142.7	151.7		101		126.8	ø5
8000B-4T1R5GB								
8000B-4T2R2GB								
8000B-4T004GB/4T5R5PB	144.4	237	249.5		155.5		159.5	ø5.9
8000B-4T5R5GB/4T7R5PB								
8000B-4T7R5GB								
8000B-4T011GB/4T015PB	156.6	378.3	364	396	214	221.7	190.5	ø6
8000B-4T015GB/4T18R5PB								
8000B-4T18R5GB								
8000B-4T022G/4T030P	235	447	424	463	285	289.6	210.3	ø7
8000B-4T030G/4T037P								
8000B-4T037G								
8000B-4T045G/4T055P	260	580	544	595.5	380	390	284.8	ø10
8000B-4T055G/4T075P								
8000B-4T075G/4T093P	343	674	650	701.5	473	485	318	ø10
8000B-4T093G/4T110P								
8000B-4T110G								
8000B-4T132G/4T160P	449	902.5	927	1359	580		384	ø10
8000B-4T160G/4T185P								
8000B-4T185G								
8000B-4T200G/4T220P	420	1162	1131.5	1481.6	680		400.5	ø12
8000B-4T220G/4T250P								
8000B-4T250G/4T280P								
8000B-4T280G/4T315P	520	1300	1355	1765	800		392.5	ø14
8000B-4T315G								
8000B-4T350G								
8000B-4T400G								

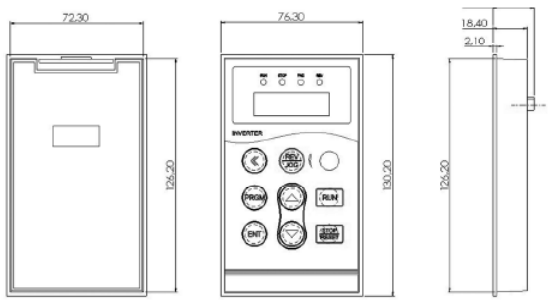
1.7 Dimensions of Extension Keyboard



0.75kW~2.2kW (model G)



4kW~7.5kW (model G)



11kW~400kW (model G)

1.8 Braking Resistor Selection Table

Inverter Model	Recommended Power of Brake Resistor	Recommended Resistance Value of Brake Resistor	Brake Unit
8000B-2SR75GB	80W	≥150Ω	Standard Accessory Inside
8000B-2S1R5GB	100W	≥100Ω	
8000B-2S2R2GB	100W	≥70Ω	
8000B-4TR75GB	150W	≥300Ω	
8000B-4T1R5GB	150W	≥220Ω	
8000B-4T2R2GB	250W	≥200Ω	
8000B-4T004GB/4T5R5PB	300W	≥130Ω	
8000B-4T5R5GB/4T7R5PB	400W	≥90Ω	
8000B-4T7R5GB	500W	≥65Ω	
8000B-4T011GB/4T015PB	800W	≥43Ω	
8000B-4T015GB/4T18R5PB	1000W	≥32Ω	
8000B-4T18R5GB	1300W	≥25Ω	Additional Accessory (external)
8000B-4T022G/4T030P	1500W	≥22Ω	
8000B-4T030G/4T037P	2500W	≥16Ω	
8000B-4T037G	3.7 kW	≥16.0Ω	
8000B-4T045G/4T055P	4.5 kW	≥16Ω	
8000B-4T055G/4T075P	5.5 kW	≥8Ω	
8000B-4T075G/4T093P	7.5 kW	≥8Ω	
8000B-4T093G/4T110P	4.5 kW×2	≥8Ω×2	
8000B-4T110G	5.5 kW×2	≥8Ω×2	
8000B-4T132G/4T160P	6.5 kW×2	≥8Ω×2	
8000B-4T160G/4T185P	16kW	≥2.5Ω	
8000B-4T185G	20 kW	≥2.5Ω	
8000B-4T200G/4T220P	20 kW	≥2.5Ω	
8000B-4T220G/4T250P	22 kW	≥2.5Ω	
8000B-4T250G/4T280P	12.5 kW×2	≥2.5Ω×2	
8000B-4T280G/4T315P	14kW×2	≥2.5Ω×2	
8000B-4T315G	16kW×2	≥2.5Ω×2	
8000B-4T350G	17kW×2	≥2.5Ω×2	
8000B-4T400G	14 kW×3	≥2.5Ω×3	

Chapter 2 Installation and Wiring

2.1 Installation

2.1.1 Installation Enviornment

◎The ambient temperature exerts great influences on the service life of the VFDs and is not allowed to exceed the specified temperature range (-10℃ to 40℃).

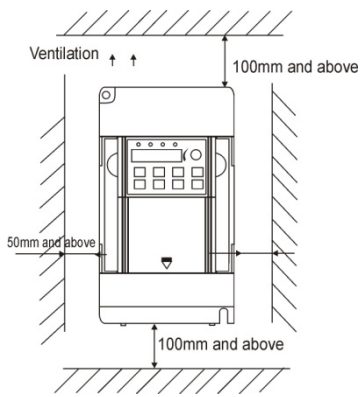
◎A VFD is easy to generate large amount of heat during operation. Thus VFDs should be mounted vertically with screws on the surface of incombustible objects, with sufficient spaces nearby for heat sinking.

◎VFDs should be mounted in the place without vibration or with vibration of less than 0.6G, especially away from those kinds or machine such as punch.

◎The inverter should be mounted in locations away from direct sunlight, high humidity, condensate, corrosive gas, explosive gas, oil dirt, dust, and metal powder etc.

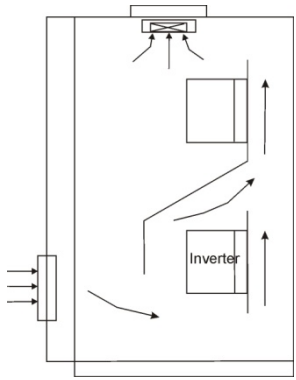
2.1.2Installation Orientation & Clearance

Single Drive & multi drives (Side by Side) Installation

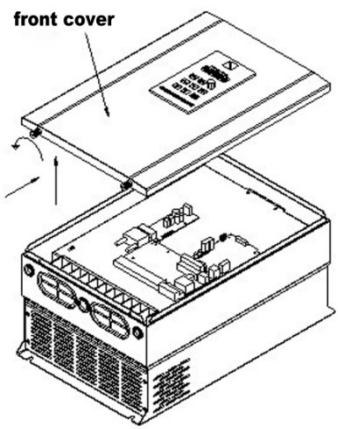


Multi Drive (up and down) Installation

When take up and down installation, air deflector should be installed between upper and lower VFD, as illustrated below.

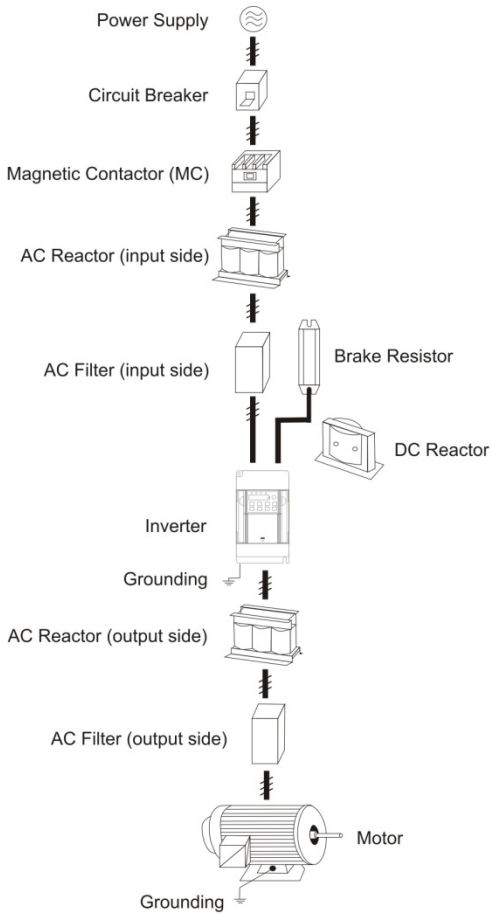


2.1.3 Removing/Reinstalling the Front Cover



2.1.4 Electric Elements and Material

Peripheral Electric Elements



Connection Diagram

2.1.5 Descriptions of External Electrical Parts

Name	Mounting Location	Function
Circuit Breaker	Front end of input circuit	Disconnect the power supply when the backward equipment is over current.
Contactor	Between the circuit breaker and inverter input side	Power ON/OFF of inverter. Do not use the contactor as the switch of inverter. Otherwise, it may cause damage to the inverter.
AC Reactor at the Input Side	Input side of inverter	1. Improve the power factor of the input side. 2. Eliminate the harmonic wave at the input side effectively and prevent other equipment from damage. 3. Eliminate the input current unbalance caused by unbalance between the power phases.
EMC Input Filter	Input side of inverter	1. Reduce the external conduction and radiation interference of inverter. 2. Decrease the conduction interference flowing from the power end to the inverter and improve the anti-interference capacity of the inverter.
DC Reactor	Additional parts of 8000B series inverter	1. Improve the power factor at the input side. 2. Improve the whole efficiency and thermal stability of the inverter. 3. Eliminate the impact of higher harmonics at the input side on the inverter and reduce the external conduction and radiation interference.
AC Reactor at the Output Side	Between inverter output side and motor. Close to inverter.	The inverter output side generally has higher harmonics. When the motor is far from inverter, since there are many distributed capacitors in the circuit, certain harmonics may cause resonance in the circuit and bring the following two impacts: 1. Degrade the motor insulation performance and damage the motor when running for long time. 2. Generate large leakage current and cause frequent inverter protection. Generally, installation of output AC reactor is recommended when the distance between inverter and motor exceeds 50m.

2.1.6 Table of Recommended Circuit Breaker, Contactor and Wire

Inverter Model	Circuit Breaker (MCCB) (A)	Recomme-nded Contactor (A)	Conducting Wire of Main Circuit at the Input Side (mm^2)	Conducting Wire of Main Circuit at the Input Side (mm^2)	Conducting Wire of Control Circuit (mm^2)
8000B-2SR75GB	16	10	2.5	2.5	1.0
8000B-2S1R5GB	20	16	4.0	2.5	1.0
8000B-2S2R2GB	32	20	6.0	4.0	1.0
8000B-4TR75GB	10	10	2.5	2.5	1.0
8000B-4T1R5GB	16	10	2.5	2.5	1.0
8000B-4T2R2GB	16	10	2.5	2.5	1.0
8000B-4T004GB/4T5R5PB	25	16	4.0	4.0	1.0
8000B-4T5R5GB/4T7R5PB	32	25	4.0	4.0	1.0
8000B-4T7R5GB	40	32	4.0	4.0	1.0
8000B-4T011GB/4T015PB	63	40	4.0	4.0	1.0
8000B-4T015GB/4T18R5PB	63	40	6.0	6.0	1.0
8000B-4T18R5GB	100	63	6.0	6.0	1.5
8000B-4T022G/4T030P	100	63	10	10	1.5
8000B-4T030G/4T037P	125	100	16	10	1.5
8000B-4T037G	160	100	16	16	1.5
8000B-4T045G/4T055P	200	125	25	25	1.5
8000B-4T055G/4T075P	200	125	35	25	1.5
8000B-4T075G/4T093P	250	160	50	35	1.5
8000B-4T093G/4T110P	250	160	70	35	1.5
8000B-4T110G	350	350	120	120	1.5
8000B-4T132G/4T160P	400	400	150	150	1.5
8000B-4T160G/4T185P	500	400	185	185	1.5
8000B-4T185G	600	600	150*2	150*2	1.5
8000B-4T200G/4T220P	600	600	150*2	150*2	1.5
8000B-4T220G/4T250P	600	600	150*2	150*2	1.5
8000B-4T250G/4T280P	800	600	185*2	185*2	1.5
8000B-4T280G/4T315P	800	800	185*2	185*2	1.5
8000B-4T315G	800	800	150*3	150*3	1.5
8000B-4T350G	800	800	150*4	150*4	1.5
8000B-4T400G	1000	1000	150*	150*4	1.5

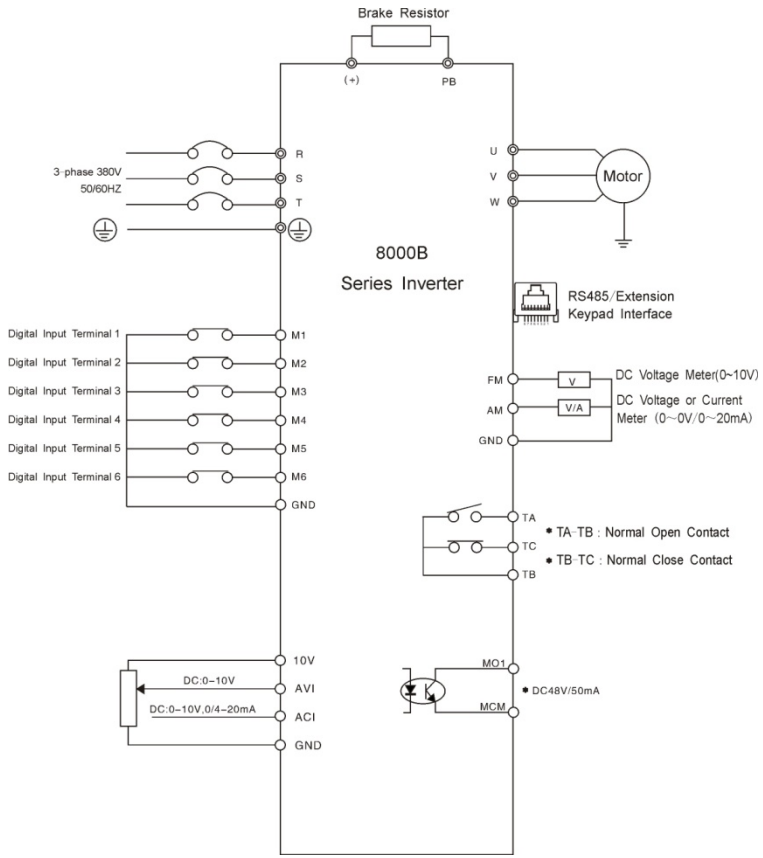
2.1.7 Table of Recommended Reactor

Inverter Model	AC Reactor at the Input Side		AC Reactor at the output Side		DC Reactor		Voltage
	Current (A)	Inducta-nce (mH)	Current (A)	Inducta-nce (mH)	Current (A)	Inducta-nce (mH)	
8000B-2SR75GB	2	7	2	7	3	28	220V
8000B-2S1R5GB	5	3.8	5	3.8	6	11	
8000B-2S2R2GB	7.5	2.5	7.5	2.5	6	11	
8000B-4TR75GB	2	7	2	3	3	28	380V
8000B-4T1R5GB	5	3.8	5	1.5	6	11	
8000B-4T2R2GB	7	2.5	7	1	6	11	
8000B-4T004GB/4T5R5PB	10	1.5	10	0.6	12	6.3	
8000B-4T5R5GB/4T7R5PB	15	1.0	15	0.25	23	3.6	
8000B-4T7R5GB	20	0.75	20	0.13	23	3.6	
8000B-4T011GB/4T015PB	30	0.60	30	0.087	33	2	
8000B-4T015GB/4T18R5PB	40	0.42	40	0.066	33	2	
8000B-4T18R5GB	50	0.35	50	0.052	40	1.3	
8000B-4T022G/4T030P	60	0.28	60	0.045	50	1.08	
8000B-4T030G/4T037P	80	0.19	80	0.032	65	0.80	
8000B-4T037G	90	0.16	90	0.030	78	0.70	
8000B-4T045G/4T055P	120	0.13	120	0.023	95	0.54	
8000B-4T055G/4T075P	150	0.10	150	0.019	115	0.45	
8000B-4T075G/4T093P	200	0.08	200	0.014	160	0.36	
8000B-4T093G/4T110P	250	0.06	250	0.011	180	0.33	
8000B-4T110G	250	0.06	250	0.011	250	0.26	
8000B-4T132G/4T160P	290	0.04	290	0.008	250	0.26	
8000B-4T160G/4T185P	330	0.04	330	0.008	340	0.18	
8000B-4T185G	400	0.04	400	0.005	460	0.12	
8000B-4T200G/4T220P	490	0.03	490	0.004	460	0.12	
8000B-4T220G/4T250P	490	0.03	490	0.004	460	0.12	
8000B-4T250G/4T280P	530	0.03	530	0.003	650	0.11	
8000B-4T280G/4T315P	600	0.02	600	0.003	650	0.11	
8000B-4T315G	660	0.02	660	0.002	800	0.06	
8000B-4T350G	400*2	0.04	400*2	0.005	460*2	0.12	
8000B-4T400G	490*2	0.03	490*2	0.004	460*2	0.12	

2.2 Wiring

2.2.1 Wiring Diagram

0.75kW~2.2kW (model G) (3-phase,380V)

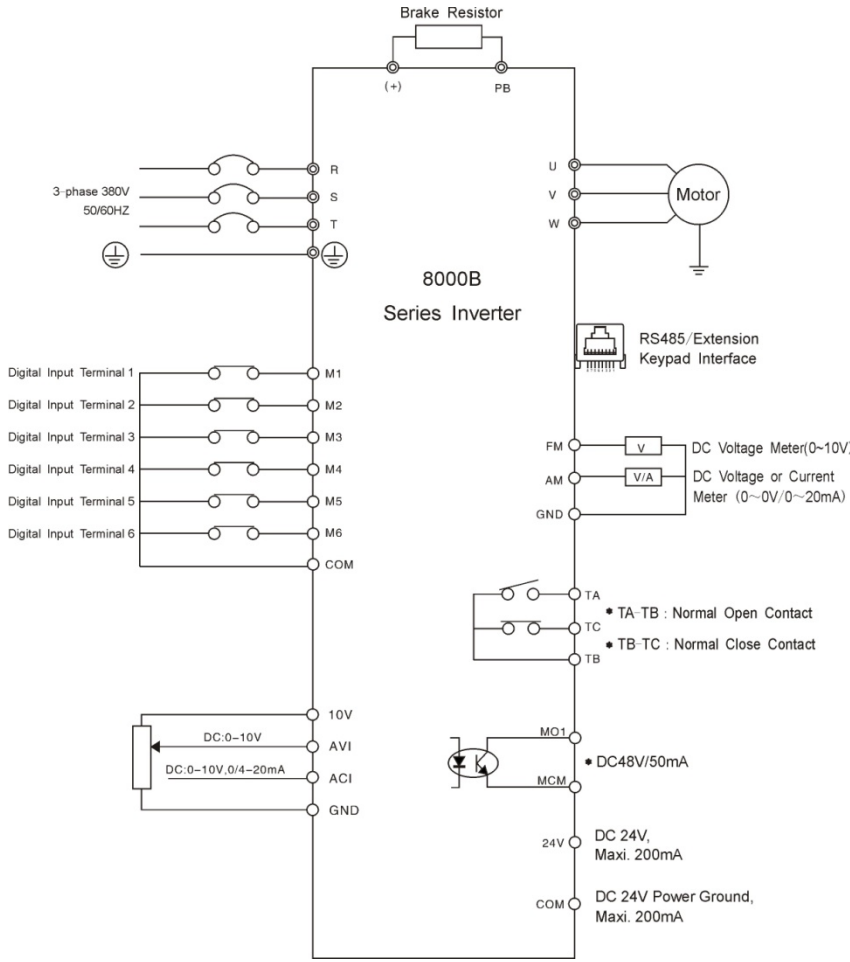


Note: 1. ◎ refers to terminals of main circuit; ○ refers to terminals of control circuit.

2. 0.75kW~2.2kW (model G) : brake unit is standard part inside.

3. 0.75kW~2.2kW (model G) of single-phase/220V: main circuit terminals are R and T.

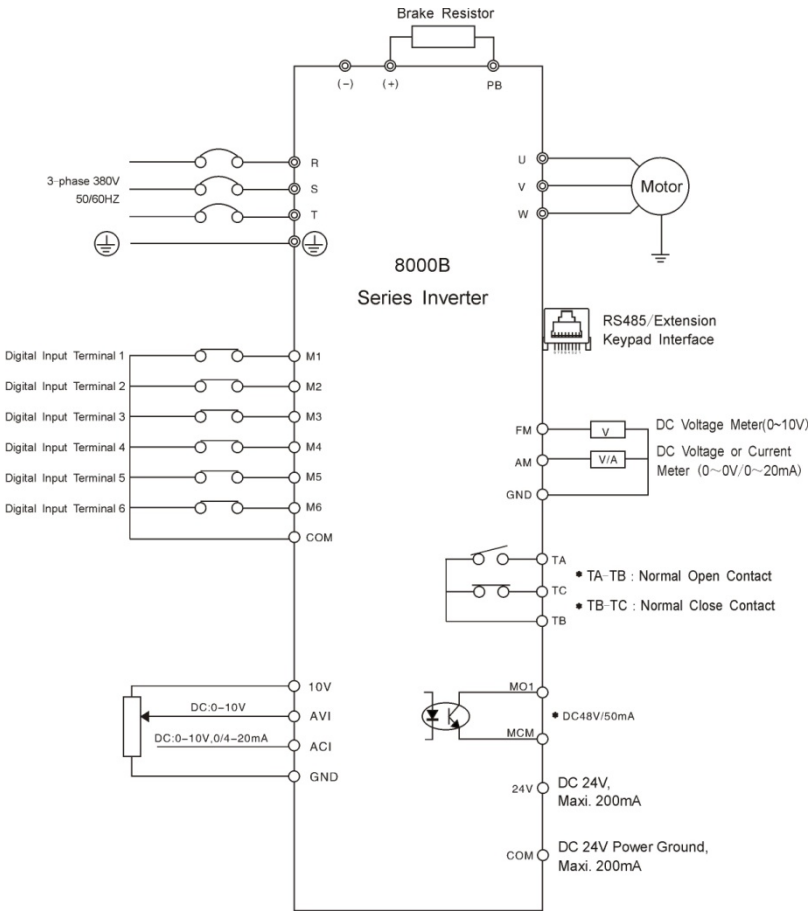
4kW~7.5kW (model G) (3-phase,380V)



Note: 1. ◎ refers to terminals of main circuit; ○ refers to terminals of control circuit.

2. 4kW~7.5kW (model G) : brake unit is standard part inside.

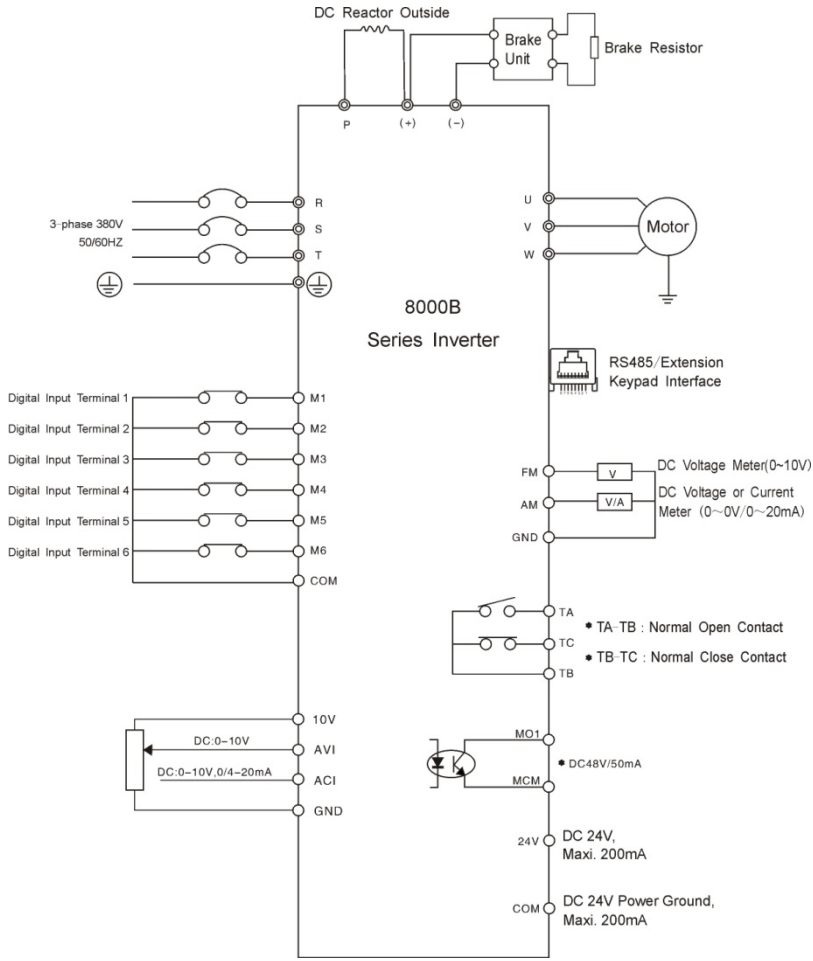
11kW~18.5kW (model G) (3-phase,380V)



Note: 1. ◎ refers to terminals of main circuit; ○ refers to terminals of control circuit.

2. 11kW~18.5kW (model G) : brake unit is standard part inside.

22kW~400kW (model G) (3-phase,380V)



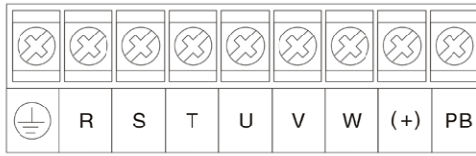
Note: 1. ◎ refers to terminals of main circuit; ○ refers to terminals of control circuit.

2. 22kW~400kW (model G) : brake unit is additional part outside.

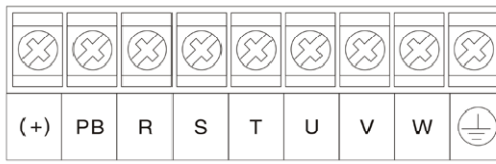
3. 22kW~400kW (model G) : DC reactor is additional part outside.

2.2.2 Main Circuit Terminals

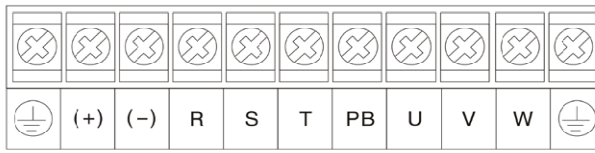
(1) 0.75kW~2.2kW (model G) with built-in brake unit



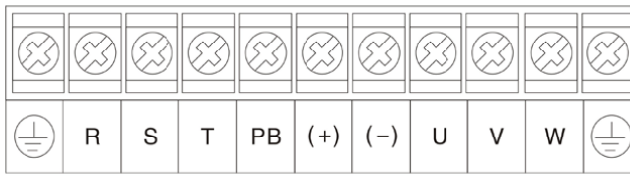
(2) 4kW~7.5kW (model G) with built-in brake unit



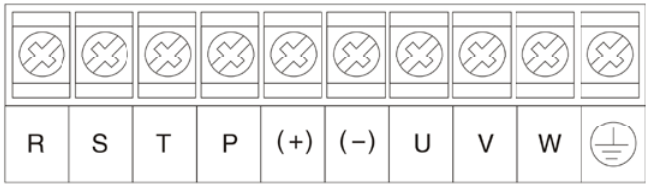
(3) 11kW~18.5kW (model G) with built-in brake unit



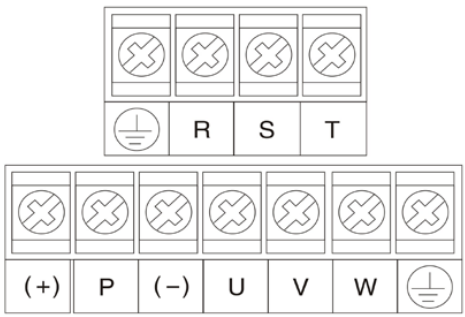
(4) 22kW~37kW (model G)



(5) 45kW~110kW (model G)



(6) 132kW~400kW (model G)



Main Circuit Terminals Description

Terminals	Descriptions
R, S, T	Terminals of AC power input.
U,V, W	Terminals of AC power output
(+), (-)	Spare terminals for connecting external brake unit.
P	Spare terminal for connecting external DC reactor.
PB	Spare terminal for connecting external brake resistor.
⏚	Grounding terminal

Note: 1.PB terminal of 22-37kW(G) drives is float as defaut. If a built-in brake unit is needed, please contact WECON and ask for custom made product.

2.To the 22-37kW(G) drives, there is no external reactor terminal in default terminals, as the P terminal of other models. If an external reactor is needed, please contact WECON and ask for custom made product.

3.All types of reator of 8000B drive are optional parts. If any reactor is needed please make a description as in model selection.

2.2.2 Precautions on Main Circuit Wiring

2.2.2.1 Terminals R, S and T

The wiring at the input side of inverter has no phase sequence requirement. When input single-phase power, use terminal R and T.

2.2.2.2 DC Bus Terminals (+) and (-)

The (+) and (-) terminals of DC bus have residual voltage right after power-off. Wait until the CHARGE indicator is OFF and make sure that the voltage is less than 36V before wiring. Otherwise it may cause electrical shock.

When use external brake unit for inverter of 22kW and above, the poles of (+) and (-) should not be connected reversely. Otherwise, it may cause damage to inverter and even cause fire.

The cable length of brake unit should be less than 10m. Use twisted pair cable or connect in parallel.

Do not connect brake resistor directly to the DC bus. Otherwise, it may cause damage to inverter and even cause fire.

2.2.2.3 Terminals (+) and PB of Brake Resistor

The terminals of brake resistor are effective only for inverter of 18.5kW and below with built-in brake unit.

The cable length of brake resistor should be less than 5m.

2.2.2.4 Terminals P and (+) of External Reactor

For inverter of 22kW and above, the reactor is additional part which is connected externally.

2.2.2.5 Terminals U, V and W

Capacitor device or surge absorber can not be connected to inverter output side by terminals U, V and W. Otherwise, it may cause frequent inverter protection or damage to inverter.

If motor cable is too long, it may generate electrical resonance easily due to the impact of distributed capacitance and thus damage the motor insulation or generate higher leakage current to cause inverter protection. When the length of motor cable is longer than 50m, installing AC reactor at the output side is necessary.

2.2.2.6 Grounding Terminal

The terminal should be grounded reliably. The resistance value of grounding cable should be less than 10Ω. Otherwise, it may cause fault or damage to the inverter.

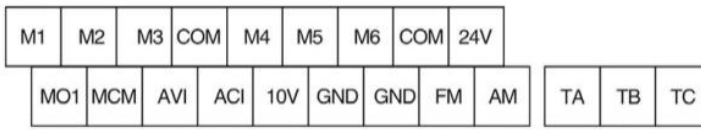
Do not share the grounding terminal with zero line of power supply.

2.2.3 Control Circuit Terminals

0.75kW~2.2kW Control Circuit Terminals

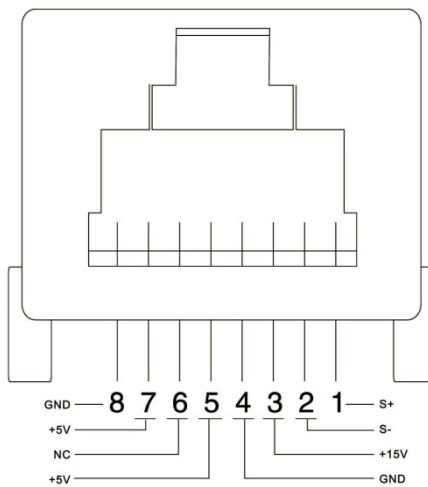
TA	TB	TC	M1	M2	M3	M4	M5	M6	GND	FM	AM	ACI	10V	AVI	GND	MCM	MO1

4kW~400kW Control Circuit Terminals



Communication Terminals

1	2	3	4	5	6	7	8
S+	S-	+15V	GND	+5V	NC	+5V	GND



Type	Terminal Symbol	Function	Interface Standard
Computer Communication	S+	485 difference signal positive terminal	Standard RS485 communication interface
	S	485 difference signal negative terminal	
	+5V	Extension power positive terminal (+5V)	
	+15V	Extension power positive terminal(+15V)	
	GND	Extension power negative terminal	

2.2.4 Descriptions of Control Circuit Terminals

Symbol	Terminal Name	Function
M1~M6	Multi-function digital input terminal	0.75-2.2kW (G): Digital terminals can not be connected to power directly. When connected to GND terminal, it is power-on and the corresponding current is 10mA. 4kW and above: Optical coupling isolation input compatible with +24V and COM. Input voltage range:9-36V, input impedance:3.3kΩ
MO1	Multi-function output terminal	(optical coupling isolating)Max. DC 48V/50mA
MCM	Common terminal of multi-function output terminal	(optical coupling isolating)Max. DC 48V/50mA
AVI	Analog input terminal 1	Input voltage range:DC 0~10V (input impedance:20kΩ)

ACI	Analog input terminal 2	1. input range:DC 0-10V or 0/4~20mA. It is selected by jumper JP1 on control board. The default is current input. 1-2Pin: voltage input; 2-3Pin: current input. 2. Input impedance:20kΩ when input voltage; 500Ω when input current.
10V	Analog reference voltage	10V ±5%,max. current: 30mA
GND	Analog grounding terminal	Zero potential referring to +10V
FM	Analog output terminal 1	FM:0~10V
AM	Analog output terminal 2	Output range: 0~10V or 0/4-20mA. It is selected by jumper JP2 on control board. The default is current output. 1-2Pin: current output; 2-3Pin: voltage output. 0.75~2.2kW:0/4~20mA. 4~400kW:0~10V / 0/4~20mA.
TA/TB/ TC	Relay output contact	TA-TB:normal open;TB-TC:normal close Contact capacity: AC 250V / 3A/ normal open AC 250V / 3A / normal close
+24V	+24V power supply	Output current: Maxi. 200mA,usually used as power of digital input/output terminals and external sensor.
COM	+24V power supply	Output current: Maxi. 200mA,usually used as power of digital input/output terminals and external sensor.

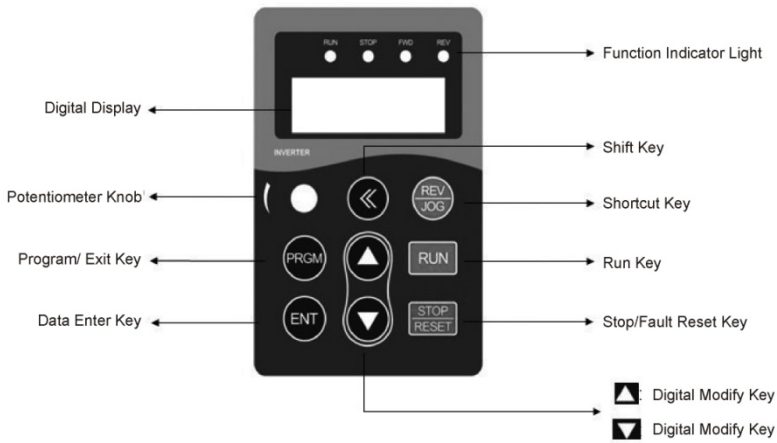
2.2.5 Precautions for Connecting Control Circuit Terminals

It is necessary to use shielded cable and twisted pair cable with well-grounded (inverter side). The cable length should be more than 20cm away from main circuit and strong electricity circuit. In order to avoid interference which can cause inverter fault, use vertical connection instead of parallel connection.

Chapter 3 Keypad Operation

3.1 Keypad Operation

3.1.1 Keypad Outline



3.1.2 Keys Description

Symbol	Key Name	Function Description
PRGM	Program/ Exit key	Enter or exit of menu, parameter modification
ENT	Data enter key	Progressively enter menu and confirm parameter
	UP increase key	Progressively increase data or function codes.
	DOWN decrease key	Progressively decrease data or function codes.

≤	Shift key	Use it to select displayed parameters cyclically during running or stop status. In parameter setting mode, press this key to select the bit to be modified.
RUN	Run key	Start to run the inverter in keypad control mode.
STOP/ RESET	Stop/reset key	In running status, restricted by function code F7.04, it can be used to stop the inverter, In malfunction alarm status, not restricted by function code F7.04, it can be used to reset the inverter.
REV/JOG	Shortcut key	Determined by function code F7.03.

3.1.3 Indicator Light Description

Indicator Light	Description
Run	Run light on: Drive running
Stop	Stop light on: Drive stop or in malfunction status
FWD	FWD light on: Drive running forward(with Run light on at the same time)
REV	REV light on: Drive running reverse(with Run light on at the same time)

3.2 Operation Details

3.2.1 Parameter Setting

Three levels of menu are as following:

· Function code group (first-class)

· Function code (second-class)

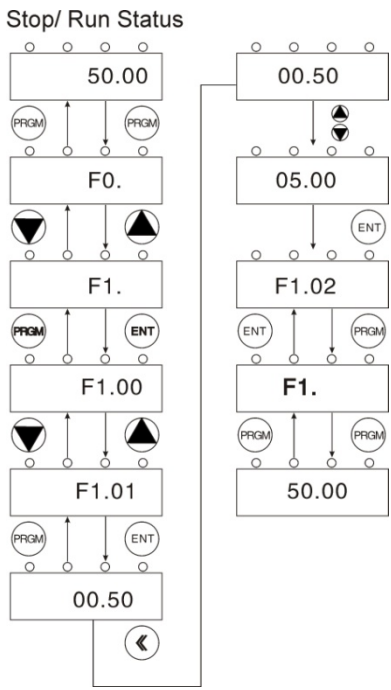
· Setting parameter of function code (third-class)

Remarks:

Pressing PRGM or ENT can return to the second-class menu from the third-class menu. The difference is: Pressing ENT will save the setting parameters into control board, and return to the second-class menu with shifting to the next function code automatically. While pressing PRGM will directly return to the second-class menu without saving the parameters, and keep staying at the current function code.

For example:

change the parameter 00.50Hz of function code F1.01 into 05.00Hz as the following flow chart shows:



Flow Chart of Parameter Setting

Under the third-class menu, if the parameter has no flickering bit, it means that the function code cannot be modified. The possible reasons include:

(1) The parameter of this function code can't be modified, such as actually detected parameter, operation records and so on.

(2) This function code can't be modified during running status, but can be modified during stop status.

3.2.2 Fault Reset

When inverter malfunction occurs, it will display the relative fault information. Use the STOP/ RESET key or terminals (determined by F5 group) to reset the fault. After fault reset, inverter is at stand-by status. If not reset when inverter is at fault status, it will keep operation protection status and cannot run.

3.2.3 Motor Parameter Autotuning

When select SVC control mode (sensorless vector control), make sure that motor nameplate parameters are correctly input into the inverter. Inverter will match standard motor parameter according to nameplate parameter. In order to achieve precise control, autotuning is necessary. Refer to the following steps:

Firstly, set the parameter of F0.01 to 0. This means that select the keypad to control stop or start. Then input the following parameters according to the motor nameplate:

F2.01: Motor rated power

F2.02: Motor rated frequency

F2.03: Motor rated rotation speed

F2.04: Motor rated voltage

F2.05: Motor rated current

Remarks:

If motor can be uncoupled with its load completely, set the parameter of F2.11 to 1 (complete tuning) and then push RUN key, inverter can calculate the parameter of motor. During autotuning process, the panel of inverter will display –RUN-. When it displays –END-, the autotuning process is finished.

If motor cannot be uncoupled with its load, set the parameter of F2.11 to 2 (static tuning) and push RUN key, inverter will auto-detect the parameters

of motor stator resistor, rotator resistor and leakage inductance, while the parameters of motor mutual inductance and no-load current are not detected. The parameters of motor mutual inductance and no-load current can be calculated by the following formula:

$$Lm = \frac{U}{2\sqrt{3}\pi f \cdot I_0} - L\delta$$

IO:motor no-load current

Lm: motor mutual inductance

Lδ: motor leakage inductance

U: motor rated voltage

I: motor rated current

f: motor rated frequency

η: motor power factor

3.2.4 Password Setting

When F7.00 is set to be non-zero, the parameter will be the user's password. After exit the function code editing status, the password will be effective after one minute. And then press the PRGM key again to try to access the function code editing mode, the inverter panel will display "0.0.0.0". The password must be input correctly to access it. If it is necessary to cancel the password function, set F7.00 to zero.

Notice: When the inverter is powered on, system will execute initialization first and inverter panel displays "8000" with four lights on. After initialization, inverter accesses into stand-by status.

Chapter 4 Function Parameter Table

4.1 Symbol Conventions:

"○": The parameters can be modified both at stop and running status.

"◎": The parameters cannot be modified at running status.

"●": The parameters are actual-detecting record value or factory preserved settings and cannot be modified.

Notice:

The 8000B drive with F7.10 software version record as 4.xx or newer is new CPU platform. The parameters related to the new CPU platform are refered to the appendix of this user manual.

4.2 Function Parameter Table

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F0 Group: Basic Parameters					
F0.00	Control mode selection	0: Sensorless vector control 1:V/F control		1	●
F0.01	Control command source	0:Keypad 1:Terminals 2: Communications (RS485)		0	●
F0.02	Options for keypad / terminals frequency ascending and descending control	0: Valid and saved when power-off 1:Valid and not saved when power-off 2: Invalid 3 . Validat running status. Changed into the setting value of F0.08 when restart after stop.		0	○
F0.03	Settings of master frequency source X	0: Up/down key 1: Potentiometer of panel		1	●

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
		2: AVI terminal			
F0.03	Settings of master frequency source X	3: ACI terminal 4: Reserved 5: Reserved 6: Multi-function digital input terminals 7: PLC 8: PID 9: Communication interface		1	●
F0.04	Settings of auxiliary frequency source Y	0: AVI terminal 1: ACI terminal 2: Reserved		1	●
F0.05	Setting range of auxiliary frequency source Y when it is superposed	0 : Relative to the maxi. Frequency 1: Relative to master frequency setting source X		0	●
F0.06	Reserved				
F0.07	Frequency reference selection	0:X 1: Y 2: X and Y 3: Max. value of (X, Y)		0	○
F0.08	Keypad setting frequency	0.00Hz~ F0.10	0.01Hz	50.00 Hz	○
F0.09	Running direction selection	0: Forward 1: Reverse 2: Reverse running prohibited		0	●
F0.10	Max. output frequency	10.00~600.00Hz	0.01Hz	50.00Hz	●

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F0.11	Upper limit frequency source selection	0:Keypad (F0.12) 1:AVI terminal 2: ACI terminal 3: Multi-function digital input terminals 4: Communication interface		0	○
F0.12	Upper limit frequency	F0.14~ F0.10	0.01Hz	50.00Hz	○
F0.13	Reserved				
F0.14	Lower limit frequency	0.00Hz~ F0.12	0.01Hz	0.00Hz	○
F0.15	The function of lower limit frequency	0 : Running at lower limit frequency 1: Stop frequency point 2: Sleep frequency point		0	○
F0.16	Carrier frequency setting	1.0~15.0kHz	1kHz	Different according to the inverter type	○
F0.17	PWM mode selection	0:PWM mode 1 1:PWM mode 2 2:PWM mode 3		0	●
F0.18	Acceleration time 1	0.1~3600.0s	0.1s	Different according to the inverter type	○
F0.19	Deceleration time 1	0.1~3600.0s	0.1s	Different according to the inverter types	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F0.20	Default setting restoring	0:No operation 1: Restore to factory setting 2:Fault record clearing		0	●
F0.21	Parameter lock and unlock	0: Unlock parameter 1: Lock parameter		0	○
F0.22	Acceleration/ deceleration method	0: Linear method 1: S curve method		0	●
F0.23	S Curve Starting Stage Ratio	0.1%~50.0%	0.1%	30.0%	●
F0.24	S Curve Finishing Stage Ratio	0.1%~50.0%	0.1%	30.0%	●
F0.25	Cooling fan running method (only for 4kW and above inverter)	0: Keep running when power on 1: Automatic running		1	○
F1 Group: Start and Stop Parameters					
F1.00	Start mode	0:Start directly 1:DC braking first and then start 2:Speed tracing and start		0	●
F1.01	Start frequency	0.00~10.00Hz	0.01Hz	1.50Hz	○
F1.02	Hold time of start frequency	0.0~50.0s	0.1s	0.0s	○
F1.03	DC braking current before start	0.0~150.0%	0.10%	0.00%	○
F1.04	DC braking time before start	0.0~50.0s	0.1s	0.0s	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F1.05	Stop mode	0: Deceleration to stop 1: Coast to stop		0	○
F1.06	Trigging frequency of DC braking at stop	0.00~ F0.10	0.01Hz	0.00Hz	○
F1.07	Waiting time before DC braking at stop	0.0~50.0s	0.1s	0.0s	○
F1.08	DC braking current at stop	0.0~150.0%	0.10%	0.00%	○
F1.09	DC braking time at stop	0.0~50.0s	0.1s	0.0s	○
F1.10	Dead time between FWD and REV	0.0~3600.0s	0.1s	0.0s	○
F1.11	Terminals control option when power on	0: Disabled 1: Enabled		1	○
F1.12 ~ F1.17	Reserved				
F1.18	Wake-up time delay	0.0~3600s	0.1s	0.0s	○
F1.19	Restart option after power-off	0: Disabled 1:Enabled		0	○
F1.20	Waiting time of restart after power-off	0.0~3600s	0.1s	0.0s	○
F1.21	Over modulation option	0: Disabled 1:Enabled		0	○
F2 Group: Motor Parameters					
F2.00	Drive model	0:General model (G) 1:Pump model (P)		0	●

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modifica-tion Type
F2.01	Motor rated power	0.4~700.0kW	0.1kW	Different according to inverter model	●
F2.02	Motor rated frequency	10.00Hz~ F0.10	0.01Hz	50.00Hz	●
Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modificatio n Type
F2.03	Motor rated rotation speed	0~36000rpm	1rpm	Different according to inverter model	●
F2.04	Motor rated voltage	0~480V	1V		●
F2.05	Motor rated current	0.8~2000A	0.1A		●
F2.06	Motor stator resistance	0.001~65.53Ω	0.001Ω		○
F2.07	Motor rotator resistance	0.001~65.53Ω	0.001Ω		○
F2.08	Motor stator inductance	0.1~6553mH	0.1mH		○
F2.09	Motor rotator mutual inductance	0.1~6553mH	0.1mH		○
F2.10	Motor no-load current	0.1~655.3A	A		○
F2.11	Motor parameters auto-tuning	0:No auto-tuning 1:Autotuning completely(no load) 2:Static auto-tuning(with load)		0	●
F2.12	Reserved				

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F3 Group: Vector Control Parameters					
F3.00	Proportional gain 1 of speed loop	0~100		20	○
F3.01	Integral time 1 of speed loop	0.01~10.00s	0.01s	0.50s	○
F3.02	Low frequency point of switch	0.00Hz~F3.05	0.01Hz	5.00Hz	○
F3.03	Proportional gain 2 of speed loop	0~100	1	25	○
F3.04	Integral time 2 of speed loop	0.01~10.00s	0.01s	1.00s	○
F3.05	High frequency point of switch	F3.02~F0.10	1Hz	10.00Hz	○
F3.06	Coefficient of slip compensation at VC control mode	50~200%	1%	100%	○
F3.07	Upper limit torque	0.0 ~200.0% (Drive rated current)	0.10%	150.00%	○
F3.08	Reserved				
F3.09	Reserved				
F3.10	Pre-alarm option when overload	0: Not detect 1: Effective during running and keep running after alarm 2: Effective during running and stop after alarm (fault code:E023) 3: Effective during constant running and keep running		1	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
		after alarm 4: Effective during constant running and stop after alarm			
F3.11	Detecting level of pre-alarm when overload	1.0~200.0% (referred to inverter rated current)	0.10%	150.00%	○
F3.12	Detecting time of pre-alarm when overload	0~600s	1s	1s	○
F4 Group: V/F Control Parameters					
F4.00	V/F curve selection	0: Linear curve 1: User-defined curve 2: 1.3 square torque-step-down curve 3: 1.7 square torque-step-down curve 4: 2 square torque-step-down curve		0	●
F4.01	Torque boost	0.0 %(auto) 0.1%~30.0%	0.10%	1.00%	○
F4.02	Torque boost cut-off frequency	0.0~50.0% (relative to motor rated frequency)	0.10%	20.00%	●
F4.03	V/F frequency 1	0.00Hz~F4.05	0.01Hz	0.00Hz	●
F4.04	V/F voltage 1	0.0%~100.0%	0.10%	0.00%	●
F4.05	V/F frequency 2	F4.03~F4.07	0.01Hz	25.00Hz	●

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F4.06	V/F voltage 2	0.0%~100.0%	0.10%	50.00%	●
F4.07	V/F frequency 3	F4.05~motor rated frequency	0.01Hz	50.00Hz	●
F4.08	V/F voltage 3	0.0%~100.0%	0.10%	100.00%	●
F4.09	Coefficient of V/F Slip compensation	0.0%~200.0%	0.10%	0.00%	○
F4.10	Energy-saving selection	0:Disabled 1:Enabled automatically		0	○
F4.11	Reserved				
F4.12	Low-frequency threshold of restraining oscillation	0~10		2	○
F4.13	High-frequency threshold of restraining oscillation	0~10		0	○
F4.14	Reserved				
F4.15	Boundary frequency of restraining oscillation	0.00Hz~F0.10 (Maxi. frequency)	0.01Hz	30.00Hz	○
F4.16	Reserved				
F4.17	AVR function selection	0:Invalid 1:Valid all the time 2: Only invalid during deceleration		1	○
F5 Group: Input Terminals Parameters					

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F5.00	M1 terminal function	0:Invalid 1:Forward run (FWD) 2:Reverse run (REV) 3:3-wire control 4:Forward jog run (FJOG) 5:Reverse jog run (RJOG) 6: Coast to stop 7: Fault reset (RESET) 8: Pause running 9: External fault input N. O. 10: UP Key command 11: DOWN Key command 12: Clear UP/DOWN setting 13: Frequency setting source switch between X and Y 14: Frequency setting source switch between X and (X+Y) 15: Frequency setting source switch between Y and (X+Y) 16: Multi-step speed terminal 1 17: Multi-step		1	●
F5.01	M2 terminal function			2	●
F5.02	M3 terminal function			7	●
F5.03	M4 terminal function			0	●

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F5.04	M5 terminal function	speed terminal 2 18: Multi-step speed terminal 3 19: Multi-step speed terminal 4 20: Multi-step speed pause 21: Acceleration/deceleration time selection terminal 1 22: Acceleration/deceleration time selection terminal 2 23: Restart simple PLC after pause 24: Simple PLC pause 25: PID pause 26: Swing frequency pause (maintain at current frequency) 27: Reset after swing frequency pause (reset to central frequency) 28: Counter reset 29:Reserved 30:Acceleration/deceleration prohibited 31:Counter triggering 32:Clear UP/DOWN setting temporarily 33: Reserved 34: Length counting input 35: Length counting clear up 36: Command source switch		0	●
F5.05	M6 terminal function			0	●
F5.06 ~ F5.08	Reserved				
F5.09	VDI Virtual Input terminal function(Note: VDI input is VDO output, without limit by On/off filter times F5.10)			0	●

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
		37: Terminal input delay output 38: Toggling PID control characteristic (F9.03) 39: Switching PID parameters 40: Pausing PID integration 41: Output DC brake(Braking current is determined by value setting of F1.03)			
F5.10	On/off filter times	1~10		5	○
F5.11	Terminal control mode	0:2-wire control mode 1 2:2-wire control mode 2 3:3-wire control mode 1 4:3-wire control mode 2		0	●
F5.12	Frequency changing rate through UP/ DOWN terminal adjusting	0.01~50.00Hz/s	0.01Hz/s	0.50Hz/s	○
F5.13	AVI lower limit	0.00V~10.00V	0.01V	0.00V	○
F5.14	Setting value corresponding to AVI lower limit	-100.0%~100.0%	0.10%	0.00%	○
F5.15	AVI upper limit	0.00V~10.00V	0.01V	10.00V	○
F5.16	Setting value corresponding to AVI upper limit	-100.0%~100.0%	0.10%	100.00%	○
F5.17	AVI input filter time	0.00s~10.00s	0.01s	0.10s	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F5.18	ACI lower limit	0.0mA~20.0mA	0.1mA	4.0mA	○
F5.19	ACI lower limit corresponding to setting value	-100.0%~100.0%	0.10%	0.00%	○
F5.20	ACI upper limit	0.0mA~20.0mA	0.1mA	20.0mA	○
F5.21	ACI upper limit corresponding to setting value	-100.0%~100.0%	0.10%	100.00%	○
F5.22	ACI input filter time	0.00s~10.00s	0.1s	0.10s	○
F5.23	M1 On delay	0.0s ～ 6000.0s	0.1s	0.0s	○
F5.24	M1 Off delay	0.0s ～ 6000.0s	0.1s	0.0s	○
F5.25	M2 On delay	0.0s ～ 6000.0s	0.1s	0.0s	○
F5.26	M2 Off delay	0.0s ～ 6000.0s	0.1s	0.0s	○
F5.27 ~ F5.30	Reserved				
F5.31	VDI On delay	0.0s ～ 6000.0s	0.1s	0.0s	○
F5.32	VDI Off delay	0.0s ～ 6000.0s	0.1s	0.0s	○
F6 Group: Output Terminals Parameters					
F6.00	MO1 output selection	0:No output 1:Motor forward running 2:Motor reverse running 3:Fault output 4: Frequency detecting level FDT output 5:Frequency reached 6:Running at zero speed 7:Upper limit frequency reached		1	○
F6.01	VDO output options(For input of VDI)			0	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F6.02	Relay 1 output selection	8:Lower limit frequency reached 9:Frequency setting value less than lower limit frequency 10:FDT reached 11:Accumulative running time reached 12:PLC cycle completed 13: VFD overload pre-alarm 14: User customized output 15:Running frequency detection 16: Terminal input delay output 17: VFD stand-by		3	○
F6.03	Reserved			0	○
F6.04	FM output selection	0:Running frequency 1:Setting frequency 2:Running rotation speed 3:Output current 4:Output voltage 5:Reserved 6:Reserved 7:Reserved 8: Analog AVI input value 9: Analog ACI input value		0	○
F6.05	FM output lower limit	0.0~100.0%	0.10%	0.00%	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F6.06	FM lower limit corresponding to output	0.00V~10.00V	0.01V	0.00V	○
F6.07	FM output upper limit	0.0~100.0%	0.10%	100.00%	○
F6.08	FM upper limit corresponding to output	0.00V~10.00V	0.01V	10.00V	○
F6.09	AM output selection	0:Running frequency 1:Setting frequency 2:Running rotation speed 3:Output current 4:Output voltage 5:Reserved 6:Reserved 7:Reserved 8: Analog AVI input value 9: Analog ACI input value		0	○
F6.10	AM output lower limit	0.0~100.0%	0.10%	0.00%	○
F6.11	AM lower limit corresponding to output	0.00V~10.00V	0.01V	0.00V	○
F6.12	AM output upper limit	0.0~100.0%	0.10%	100.00%	○
F6.13	AM upper limit corresponding to output	0.00V~10.00V	0.01V	10.00V	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F6.14	User defined output variability option (EX)	0:Running frequency 1:Setting frequency 2:DC bus voltage 3:Output current 4:Output voltage 5:Sign of start and stop status 6:Sign of control status 7:Counter value 8:Counting meter value 9:Inverter module temperature 10:AVI input value 11:ACI input value			
F6.15	Comparison method of user defined output	Units digit: comparison test method 0: Equal (EX==X1) 1: Equal or greater than 2: Equal or less than 3: Interval comparison (X1≤EX≤X2) 4:Units digit test (EX&X1=X2) Tens digit : output method 0: False value output 1: Real value output		0	○
F6.16	User defined output dead zone	0~65535		0	○
F6.17	Output comparison value X1	0~65535		0	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F6.18	Output comparison value X2	0~65535		0	○
F7 Group: Display Interface Parameters					
F7.00	User password	0~9999		0	○
F7.01	Parameter group hiding	0000~FFFF		0000	○
F7.02	Reserved				
F7.03	REV/JOG key function	0:Switch display status 1:Clear UP/DOWN setting 2:Reverse running 3:Forward jog running 4:Quick debugging mode		2	●
F7.04	STOP/RESET key stop function	0:Only valid for keypad setting 1:Valid for both keypad setting and terminals setting 2:Valid for both keypad setting and communication interface setting 3:Valid for all control mode		0	○
F7.05	Reserved				
F7.06	Running status display selection 1	0~0xFFFF BIT0:Running frequency BIT1:Setting frequency BIT2:DC bus voltage BIT3:Output voltage BIT4:Output current BIT5:Running speed		35	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
		BIT6:Linear speed BIT7:Reserved BIT8:Reserved BIT9:PID setting value BIT10:PID feedback value BIT11:Input terminals status BIT12:Output terminals status BIT13:Reserved BIT14:Counter value BIT15:Current step of multi-step speed and PLC			
F7.07	Running status display selection 2	1~0xFFFF BIT0:AVI value BIT1: ACI value BIT2:Reserved BIT3: Motor overload ratio BIT4: Inverter overload ratio BIT5:Running time BIT6:Counting meter value BIT7~BIT15: Reserved		0	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F7.08	Stop status display selection	0~0xFFFF BIT0: Setting frequency BIT1: DC bus voltage BIT2:Input terminal status BIT3:Output terminal status BIT4:PID setting value BIT5:PID feedback value BIT6:AVI value BIT7:ACI value BIT8:Reserved BIT9: Current step of multi-step speed and PLC BIT10:Reserved BIT11:Counting meter value BIT12~BIT15:Reserved		3	○
F7.09	Inverter module temperature	0~100℃	1℃		◎
F7.10	Inverter software version				◎
F7.11	Accumulative running time	0~9999h	1hour		◎
F7.12	Accumulative power-on time	0~9999h	1hour		◎
F7.13	Reserved				
F8 Group: Auxiliary Function Parameters					
F8.00	Jog running frequency	0.00~F0.10	0.01Hz	5.00Hz	○
F8.01	Jog running	0.1~3600s	0.1s	Defined by	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
	acceleration time			inverter model	
F8.02	Jog running deceleration time	0.1~3600s	0.1s		○
F8.03	Acceleration time 2	0.1~3600s	0.1s		○
F8.04	Deceleration time 2	0.1~3600s	0.1s		○
F8.05	Acceleration time 3	0.1~3600s	0.1s		○
F8.06	Deceleration time 3	0.1~3600s	0.1s		○
F8.07	Acceleration time 4	0.1~3600s	0.1s		○
F8.08	Deceleration time 4	0.1~3600s	0.1s		○
F8.09	Jump frequency 1	0.00~F0.10	0.01Hz	0.00Hz	○
F8.10	Jump frequency 2	0.00~F0.10	0.01Hz	0.00Hz	○
F8.11	Jump frequency width	0.00~F0.10	0.01Hz	0.00Hz	○
F8.12	Frequency detection value(FDT)	0.00~F0.10	0.01Hz	50.00Hz	○
F8.13	FDT hysteresis	0.0~100.0%	0.10%	5.00%	○
F8.14	Detecting range of reached frequency	0.0~100.0% (Maxi. Frequency)	0.10%	0.00%	○
F8.15	Braking threshold voltage	115.0~140.0% (Standard DC bus voltage)	0.10%	120.00%	○
F8.16	Speed display coefficient	0.1~999.9%	0.10%	100.00%	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
8.17	Option as running time reached	0:Keep running 1:Stop		0	○
F8.18	Running time setting	0~9999h	1h	9999	○
F8.19	Droop control	0.00Hz~10.00Hz	0.01Hz	0.00Hz	○
F8.20	Panel potentiometer filter time selection	0.00~10.00s	0.01s	0.10s	○
F8.21	Output delay time selection	0~9999s	0.1s	0.0s	○
F8.22	Lower limit of frequency detecting	0.00~Maxi. Frequency	0.01Hz	20.00Hz	○
F8.23	Upper limit of frequency detecting	0.00~Maxi. Frequency	0.01Hz	40.00Hz	○
F8.24	Reserved				
F8.25	Inverter rated power	0.4~700.0kW	0.1kW	Defined by inverter model	◎
F8.26	Inverter rated current	0.0~2000A	0.1A		◎
F8.27	Linear speed display coefficient	0.1~ 999.9% (linear speed = mechanical speed * F8.27)	0.10%	1.00%	○
F8.28 ~ F8.29	Reserved				
F9/FE Group PID Control Parameters					

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F9.00	PID setting source	0:Keypad (F9.01) 1:Analog terminal AVI 2:Analog terminal ACI 3:Communication interface 4:Muli-function digital input terminals		0	○
F9.01	PID preset value	0.0%~100.0%	0.10%	0.00%	●
F9.02	PID feedback selection	0:Analog terminal AVI 1:Analog terminal ACI 2:AVI+ACI 3:Communication interface		0	○
F9.03	PID output characteristic	0: Positive 1: Negative		0	○
F9.04	Proportional gain (Kp1)	0.0~100.0	0.1	20.0	○
F9.05	Integral time (Ti1)	0.01~10.00s	0.01s	2.00s	○
F9.06	Differential time (Td1)	0.00~10.00s	0.01s	0.00s	○
F9.07	Sampling period (T)	0.01~100.0s	0.01s	0.10s	○
F9.08	PID control deviation limit	0.0~100.0%	0.10%	0.00%	○
F9.09	Feedback loss detecting time	0.0~100.0%	0.10%	0.00%	○
F9.10	Feedback lost detecting time	0.0~3600.0s	0.1s	1.0s	○
F9.11	PID sleep function option	0: PID normal working 1: PID sleep		0	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
F9.12	PID sleep detecting delay time	0.0~3600.0s	0.1s	3.0s	○
F9.13	PID wake-up threshold	0.0~100.0%	0.10%	0.00%	○
F9.14	PID wake-up detecting delay time	0.0~3600.0s	0.1s	3.0s	○
F9.15	Lower retaining frequency of PID sleep detecting	0.00Hz~20.00Hz	0.01Hz	10.00Hz	○
F9.16	PID Lower retaining frequency running time	0.0s~3600.0s	0.1s	10.0s	○
F9.17	PID sleep threshold	F9.13~100.0%	0.1%	80.0%	
F9.18	Reserved				
FE.00	Proportional gain (Kp2)	0.0~100.0	0.1	20.0	○
FE.01	Integral time (Ti2)	0.01~10.00s	0.01s	2.00s	○
FE.02	Differential time (Td2)	0.00~10.00s	0.01s	0.00s	○
FE.03	PID parameters switching condition	0~2		0	○
FE.04	PID parameter switching deviation 1	0.0%~FE.05	0.1%	20.0%	○
FE.05	PID parameter switching deviation 2	FE.04~100.0%	0.1%	80.0%	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FE.06	PID initial value	0.0%~100.0%	0.1%	0.0%	○
FE.07	PID initial value time	0.00s~650.00s	0.01s	0.00s	○
FE.08	PID integration options	Unit's digit: Integration separation 0: Disabled 1: Enabled Ten's place: Output limit and stop options 0: Continuing calculation 1: Stop calculation		00	○
FE.09	Max. increasing value permitted each PID output	0.00%~100.00%	0.01%	1.00%	○
FE.10	Max. decreasing value permitted each PID output	0.00%~100.00%	0.01%	1.00%	○
FE.11	PID reverse output frequency limit	0.00Hz~F0.10	0.01Hz	0.00Hz	○
FE.12	PID differentiation limit	0.00%~100.0%	0.01%	0.10%	○
FE.13	PID setting value time	0.00s~650.0s	0.01s	0.00s	○
FE.14	PID feedback filter time	0.00s~60.00s	0.01	0.00s	○
FE.15	PID output filter time	0.00s~60.00s	0.01	0.00s	○
FE.16	PID calculation options during VFD stop	0: Stop calculation 1: Continuing calculation		0	○
FA Group: Protection and Malfunction Parameters					

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FA.00	Motor overload protection	0:Disabled 1:Normal motor with low speed compensation 2:Variable frequency motor without low speed compensation		2	●
FA.01	Motor over load protection current	20.0%~120.0% (motor rated current)	0.10%	100.00%	○
FA.02	Threshold for frequency reducing at instantaneous power failure	70.0%~110.0% (standard bus voltage)	0.10%	80.00%	○
FA.03	Frequency reducing rate at instantaneous power failure	0.00Hz~F0.10	0.01Hz	0.00Hz	○
FA.04	Over-voltage stalling protection	0:Disabled 1:Enabled		0	○
FA.05	Over-voltage stalling protection point	110~150%	1%	120%	○
FA.06	Auto current limiting level	50~200%	1%	160%	○
FA.07	Frequency decrease rate during current limiting	0.00~50.00Hz/s	0.01Hz/s	10.00Hz/s	○
FA.08	Auto current limiting selection	0:Enabled 1: Disabled at constant speed		1	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FA.09	Fault auto-reset times	0~3		0	○
FA.10	Fault auto-reset interval	0.1~100.0s	0.1s	1.0s	○
FA.11	Reserved				
FA.12	Phase-lack protection of input	0:Disabled 1:Enabled		1	○
FA.13	Phase-lack protection of output	0: Disabled 1:Enabled		1	○
FA.14	Fault type last two time	0: No fault 1: Inverter module fault (E001) 2. Over-current during acceleration (E002) 3: Over-current during deceleration (E003) 4: Over-current at constant speed (E004) 5: Over-voltage during acceleration (E005) 6: Over-voltage during deceleration (E006) 7: Over-voltage at constant speed (E007) 8: Hardware overvoltage (E008) 9: Under voltage of DC bus (E009) 10: Drive overload			◎
FA.15	Fault type last time				◎
FA.16	Current fault type				◎

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
		(E010) 11: Motor overload (E011) 12: Phase-lack of input (E012) 13: Phase-lack of output (E013) 14: Module overheat (E014) 15: External fault (E015) 16: Communication fault (E016) 17: Reserved 18: Current detection fault (E018) 19: Motor auto-tuning fault (E019) 20: Reserved 21: Reserved 22: EEPROM fault (E022) 23: Overload pre-alarm (E023) 24: PID feedback loss fault (E024) 25: Running time reached (E025) 26: Counting meter reached (FULL)			
FA.17	Running frequency at current fault		Hz		◎
FA.18	Output current at current fault		A		◎

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FA.19	DC bus voltage at current fault		V	0.0V	◎
FA.20	Input terminal status when fault occurs			0	◎
FA.21	Output terminal status when fault occurs			0	◎
FB Group: Swing Frequency and Counting Meter Parameters					
FB.00	Swing frequency range	0.0~100.0% (relative to setting frequency)	0.10%	0.00%	○
FB.01	Skip frequency range	0.0~50.0% (relative to swing frequency bandwidth)	0.10%	0.00%	○
FB.02	Rising time of swing frequency	0.1~3600.0s	0.1s	5.0s	○
FB.03	Dropping time of swing frequency	0.1~3600.0s	0.1s	5.0s	○
FB.04	Fixed length control mode	0:Start from zero when power on 1:Start from counting meter of the last time	0.1s	5.0s	○
FB.05	Roller perimeter for fixed length control	0~9999cm	1cm	100cm	○
FB.06	Fixed length setting	0~9999m	1m	1000m	○
FB.07	Clear length value	0:Invalid 1:Valid		0	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FB.08	Counter value setting	FB.09~9999		0	○
FB.09	Designated counter value	0~FB.08		0	○
FB.10	Length unit selection	0 :Actual counting length = displayed length* 1m 1: Actual counting length= displayed length* 10m		0	○
FC Group: RS485 Communication Parameters					
FC.00	Local address	1~247, 0 refers to the broadcast address		1	○
FC.01	Baud rate selection	0:1200BPS 1:2400BPS 2:4800BPS 3:9600BPS 4:19200BPS 5:38400BPS		3	○
FC.02	Data bit check and format	0: No check (N, 8, 1) for RTU 1: Even parity check (E, 8, 1) for RTU 2: Odd parity check (0, 8, 1) for RTU 3: No check (N, 8, 2) for RTU 4: Even parity check (E, 8, 2) for RTU 5: Odd parity check (0, 8, 2) for RTU		0	○
FC.03	Communication response delay time	0~200ms	1ms	5ms	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FC.04	Communication timeout fault setting	0.0 (invalid), 0.1~100.0s	0.1s	0.0s	○
FC.05	Method of disposing communication timeout fault	0:Alarm and coast to stop 1:No alarm and continue to run 2:No alarm but stop according to F1.05 (only when F0.01=2) 3: No alarm but stop according to F1.05		1	○
FC.06	Transmission response action	Unit's digit: 0: Response to writing 1: No response to writing Ten's place: 0:Value not saved when poweroff 1: Value saved when power-off		0	○
FD Group:Multi-step Speed and Simple PLC Parameters					
FD.00	Simple PLC operation method	0:Stop after operation once time 1:Keep the f inal value af ter operation once time 2:Operation in cycles		0	○
FD.01	Memory option of simple PLC when power-off	0: Invalid 1:Valid		0	○
FD.02	Multi-step speed 0	-100~100%	0.10%	0.00%	○
FD.03	0^{th} step running time	0.0~6553s(m)	0.1s(m)	0.0s	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FD.04	Multi-step speed 1	-100~100%	0.10%	0.00%	○
FD.05	1st step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.06	Multi-step speed 2	-100~100%	0.10%	0.00%	○
FD.07	2nd step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.08	Multi-step speed 3	-100~100%	0.10%	0.00%	○
FD.09	3rd step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.10	Multi-step speed 4	-100~100%	0.10%	0.00%	○
FD.11	4th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.12	Multi-step speed 5	-100~100%	0.10%	0.00%	○
FD.13	5th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.14	Multi-step speed 6	-100~100%	0.10%	0.00%	○
FD.15	6th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.16	Multi-step speed 7	-100~100%	0.10%	0.00%	○
FD.17	7th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.18	Multi-step speed 8	-100~100%	0.10%	0.00%	○
FD.19	8th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FD.20	Multi-step speed 9	-100~100%	0.10%	0.00%	○
FD.21	9th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.22	Multi-step speed 10	-100~100%	0.10%	0.00%	○
FD.23	10th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.24	Multi-step speed 11	-100~100%	0.10%	0.00%	○
FD.25	11th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.26	Multi-step speed 12	-100~100%	0.10%	0.00%	○
FD.27	12th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.28	Multi-step speed 13	-100~100%	0.10%	0.00%	○
FD.29	13th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.30	Multi-step speed 14	-100~100%	0.10%	0.00%	○
FD.31	14th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.32	Multi-step speed 15	-100~100%	0.10%	0.00%	○
FD.33	15th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.34	Acceleration time of 0th~7th steps	0~0xFFFF		0	○
FD.35	Acceleration time of 8th~15th steps	0~0xFFFF		0	○

Function Code	Function	Descriptions	Minimum Unit	Factory Setting	Modification Type
FD.36	PLC restart method	0: Restart from 1st step 1: - 76 -est art from break-off frequency	0	0	○
FD.37	PLC operation time unit	0: second (s) 1: minute (m)		0	○
FF Group: Reserved Factory Parameters					

Chapter 5 Function Parameter Description

5.1 F0 Group—Basic Function

F0.00	Control Mode Selection		Factory Setting	1
	Setting Options	0	Sensorless vector control	
		1	V/F control	

Select one operation mode for the drive.

0: Sensorless vector control.

This mode refers to open loop vector control. It is suitable to high performance general applications of VFD without PG encoder feedback, such as machine tool, centrifugal machines, wire drawing bench, injection molding machine, etc. In this mode, one VFD can drive only one electric motor at a time.

1: V/F control

V/F control is suitable to applications which do not require high accuracy of torque and speed control, such as fans and pumps etc. In those applications, a VFD can drive multiple motors simultaneously.

Note: When choosing vector control mode, it is necessary to perform motor parameter auto-tuning first. Only getting accurate motor parameters before driving a motor can achieve the advantage of vector control mode. And more optimized performance will be achieved by adjusting parameters of the speed regulator(in F3 group).

F0.01	Control command source		Factory Setting	0
	Setting Options	0	Keypad	
		1	Terminals	
		2	Communication (RS485)	

Select the channel of the control command of the VFD.

The control command of a VFD includes: start, stop, forward, reverse and jogging.

0: keypad

The command of start and stop can be executed through the key of RUN,REV, STOP/RESET on the keypad.

1: terminals

The VFD is controlled by multi-function digital input terminals M1～M6.

2: communications

The upper controller gives the command of start and stop through the method of communication.

F0.02	Options for keypad / terminals frequency ascending and descending control		Factory Setting	0
	Setting Options	0	Valid and saved when power-off	
		1	Valid and not saved when power-off	
		2	Invalid	
		3	Control is valid while running, and is invalid while stop. When stopped or power off, the VFD will not save data	

The frequency of the VFD can be set through "▲"and "▼" and UP/DOWN terminal(frequency ascending control/frequency descending control), it has the highest priority and can be combined with any other channels used for frequency setting. Its main function is to finish the fine adjustment of output frequency of the VFD in commissioning process of control system.

0: valid, and the VFD can save data when powered off. The frequency data of VFD can be set, and after powered off, the VFD can save the set value. When powered on next time, the previous saved value can be combined with the present setting value automatically.

1: valid, but the VFD cannot save data when powered off. The frequency data of

VFD can be set, however after power-off, the VFD will not save this setting value.

2:invalid, the "▲"and "▼" on keypad and the function of UP/DOWN terminal is invalid, and the settings will be cleared automatically.

3：When the VFD is in running condition, the control of "▲"and "▼" on keypad and the function of UP/DOWN terminal is valid. When stopped, the settings of "▲"and "▼" on keypad and the UP/DOWN terminal will be zeroed out.

Note: when users restore the default value of the functional parameters of the VFD, the setting frequency value of the keypad and UP/DOWN terminal will be zeroed out.

F0.03	Settings of master frequency source X		Factory Setting	1
	Setting Options	0	Digital setting Up/down key	
		1	Potentiometer of panel	
		2	AVI terminal	
		3	ACI terminal	
		4	Reserved	
		5	Reserved	
		6	Multi-step speed terminals	
		7	Simple PLC	
		8	PID	
		9	Communication interface	

Select the input channel of master frequency of the VFD. Altogether 8 master frequency channels are available:

0: digital setting of the panel

The initial value is the value of F0.08 "keypad setting frequency".

The settings of frequency value of the VFD can be adjusted through ▲and ▼ key and the multi-function digital input terminal UP/DOWN terminal.

1: settings by a potentiometer of the panel

2: AVI

3: ACI

Options of AVI and ACI mean that the frequency is determined by one of the analog input terminals. A standard VFD unit has 2 analog input terminals, among them AVI is input by voltage 0～10V；by using jump line selection, ACI can be choosed in the way of 0～10V voltage and 0/4～20mA current.

4: Reserved

5: Reserved

6: Multi-step speed terminals

Select the running method of multi-function digital input. The parameters of F5 group “input terminals” and FD group “Multi-step Speed and Simple PLC Parameters” need to be set in order to determine the corresponding relation between the command signal and the command frequency.

7: Simple PLC

Select the mode of simple PLC. When the source of frequency is Simple PLC, the parameters of FD group “Multi-step Speed and Simple PLC Parameters” need to be set in order to determine the command frequency.

PID：Select PID control. And the F9 group “PID function” parameters need to be set. The running frequency of the VFD is the output of PID’s function. As for the implication of PID setting source, preset value and feedback source etc please see the introduction of F9 group “PID function”.

Communication interface

This means the master source of frequency is given by the upper controller through communication methods.

F0. 04	Settings of auxiliary frequency source Y		Factory Setting	0
	Setting Options	0	AVI	
		1	ACI	
		2	Reserved	

When the auxiliary frequency source is used as an independent frequency command channel(that is the selection of frequency changes from X to Y), its direction for usage is the same as master frequency source X.

F0. 05	Setting range of auxiliary frequency source Y when it is superposed		Factory Setting	0
	Setting Options	0	Relative to the max. frequency	
		1	Relative to the master frequency source X	
F0.06	Reserved			

When the frequency source is selected as superposed frequency source(set F0.07 as 1 or 3), the two parameters are used to determine the adjustable range of the auxiliary frequency source. F0.05 can determine the corresponding range reference for the auxiliary frequency source, if the corresponding object is the maximum frequency(F0.10), the range of the auxiliary frequency source will be fixed; if the corresponding object is the master frequency source X, the range of the auxiliary frequency source will change along with the change of master frequency source X.

F0. 07	Frequency reference selection		Factory Setting	0
	Setting Options	0	Mater frequency source X
		1	Auxiliary frequency source Y
		2	Mater frequency source X plus auxiliary frequency source Y
		3	Max. value of (mater frequency source X, auxiliary frequency source Y)

0: Present frequency reference is master frequency source X

1: Present frequency reference is auxiliary frequency source Y

2: Present frequency reference is master frequency source X plus auxiliary frequency source Y

3: Select the bigger one of the value of master frequency source X and auxiliary frequency source Y as the frequency reference

F0. 08	Keypad setting frequency		Factory Setting	50.00 Hz
	Setting Options	0.00Hz～ F0.10 (the setting value is valid when the master or auxiliary frequency source is digital setting)		

When the master frequency source is selected as “digital setting UP/DN key”, the value of this functional code is the original value of the frequency settings of the VFD.

F0.09	Running direction selection		Factory Setting	0
	Setting Options	0	Forward	
		1	Reverse	
		2	Reverse running prohibited	

The turning direction of the motor can be changed through setting options of this functional code. It is equivalent to adjusting any two lines (U, V, W) of the motor for changing the turning direction.

Note:The turning direction of electric motor will return to its original state after initialization of parameters. Please use this very cautiously under the occasion that the system has finished debugging procedures and any change of the turning direction of electric motor is prohibited.

F0.10	Max. output frequency	Factory Setting	50.00Hz
	Setting Options	10.00～600.00Hz	

F0.11	Upper limit frequency source selection		Factory Setting 0
	Options	0	Keypad setting (F0.12)
		1	AVI terminal (100% corresponds to the setting frequency of F0.12)
		2	ACI terminal (100% corresponds to the setting frequency of F0.12)
		3	Multi-step speed terminals (Multi-step speed frequency setting is the upper limit frequency)
		4	Communications interface

Define the source of the upper limit frequency. The upper limit frequency can come from keypad settings (F0.12), or from analog inputs. When using an analog input to set the upper limit frequency, the value of 100% of the analog input is corresponding to F0.12.

F0.12	Upper limit frequency	Factory Setting	50.00Hz
	Setting Options	F0.14～ F0.10	
F0.13	Reserved		

F0.14	Lower limit frequency	Factory Setting	0.00Hz
	Setting Options	0.00Hz～ Upper limit frequency F0.12	

When the VFD starts running, it will starts from the start frequency. In the running process, if the command frequency is lower than the lower limit frequency, the VFD will run at the lower limit frequency, stop or run at zero speed, and the running mode at this situation can be set by F0.15.

F0.15	The function of lower limit frequency		Factory Setting	0
	Setting Options	0	Running at lower limit frequency	
		1	Stop	
		2	Sleep	

Selecting the running mode of the VFD when the set frequency is lower than the lower limit frequency. In order to avoid the long term low speed operation of the electric motor, this functional parameter can be used to select the stop mode.

F0.16	Carrier frequency setting	Factory Setting	According to model
	Setting Options	1.0～15.0kHz	

This function can adjust the carrier frequency of the VFD. By adjusting carrier frequency, the motor noises can be improved, the resonance point of mechanical system can be avoided and the influences of earth leakage and interference from VFD can be reduced.

When the value of carrier frequency is set higher, the motor loss will drop, the temperature rise of motor will decrease, but the loss of VFD will rise, the temperature rise of the VFD will increase and the interference to VFD will also increase.

Following is Influences to the corresponding performances while adjusting the carrier frequency:

Carrier frequency	Low → High
Motor noises	Loud → Low
Output current waveform	Bad → Good
Temperature rise of motor	High → Low
Temperature rise of VFD	Low → High
Leakage current	Small → Large
Exterior radiation interference	Small → Large

F0.17	PWM mode selection		Factory Setting	0
	Setting Options	0	PWM mode 1	
		1	PWM mode 2	
		2	PWM mode 3	

0：PWM mode 1, this mode is a normal PWM mode, when the frequency is low, the motor noise is low,on the contrary the noise is loud.

1: PWM mode 2, the motor noise is low when the motor runs in this mode, but the motor temperature rise is high. The rated power of the VFD should be degraded if this function is chosen.

2: PWM mode 3,the motor noise is loud when the motor runs in this mode, but this mode has a very good inhibiting effect for elec-mech oscillation.

F0.18	Acceleration time 1	Factory Setting	According to model
	Setting scope	0.1～3600.0s	
F0.19	Deceleration time 1	Factory Setting	According to model
	Setting scope	0.1～3600.0s	

Acceleration time 1 means the needed time T1 that the VFD accelerate from 0Hz to the Max. output frequency(F0.10).

Deceleration time 1 means the needed time T2 that the VFD decelerate from the Max. output frequency(F0.10)to 0Hz.

See the diagram below:

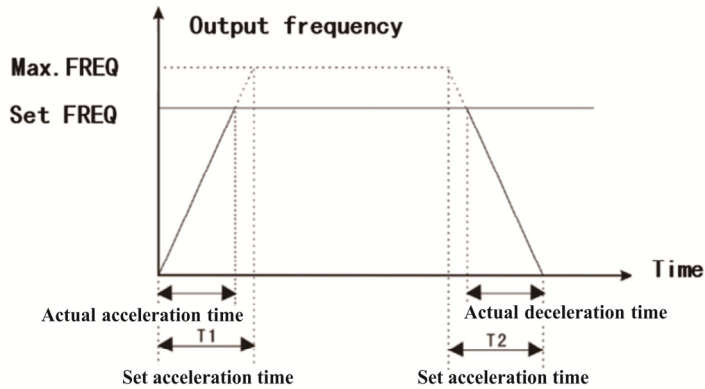


Figure xx Sketch Map of Acceleration and Deceleration Time

Note: The difference between the actual acceleration/deceleration time and the set acceleration/ deceleration time.

Totally 4 groups of acceleration and deceleration time are optional.

Group 1:F0.18, F0.19;

Group 2:F8.03, F8.04

Group 3:F8.05, F8.06

Group 4 F8.07, F8.08.

The acceleration and deceleration time can be selected through the multi-function digital input terminals (F5.00～F5.05).

F0.20	Default Setting Restoring		Factory Setting	0
	Setting Options	0	No operation	
		1	Restore to factory setting	
		2	Fault record clearing	

O: No operation

1: The VFD restore all the parameters(except parameters from group F2) to factory settings.

2:The VFD clear all the recent default records.

F0.21	Parameter lock and unlock		Factory Setting	0
	Setting Options	0	Unlock parameter	
		1	Lock parameter	

0:Unlock parameter

1: Lock parameter. After being locked, all the parameters can not be changed except F0.21.

F0.22	Acceleration/ deceleration method		Factory Setting	0
	Setting Options	0	Linear method	
		1	S curve method	

Selection of the change mode of frequency during start and operation process.

0: Linear method of speed acceleration. The output frequency ascends or descends linearly.

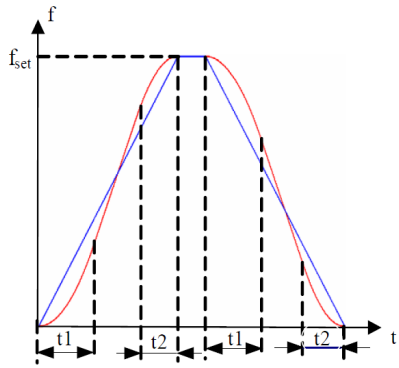
1:S curve method: The output frequency ascends or descends in S curve shape.

F0.23	S Curve Starting Stage Ratio		Factory Setting	30.0%
	Setting Options	0.1%~50.0%		
F0.24	S Curve Finishing Stage Ratio		Factory Setting	30.0%
	Setting Options	0.1%~50.0%		

Parameters F0.23 and F0.24 define the S curve method's starting and finishing

time ratio separately, and they must fulfill the requirement as: F0.23+F0.24≤ 100.0%.

In the following chart, t1 refers to F0.23, t2 refers to F0.24. The acceleration/deceleration ratio during the time between t1 and t2 is fixed.



S Curve Acceleration/Deceleration Method

F0.25	Cooling fan running method (only for 4kW and above inverter)		Factory Setting	1
	Setting Options	0	Keep running when power on	
		1	Automatic running	

0: Keep running when power on. When the VFD is powered on, the cooling fan keeps running.

1: Automatic running. When the VFD is in operation, the cooling fan is also in operation; when the VFD stops, the cooling fan will stop after 30s' time delay.

Note: The cooling fans of the 2.2Kw (and below) VFD are uncontrollable, only the fans of 4Kw (and above) VFD can be controlled by F0.25.

5.2 F1 Group: Start and Stop Parameters

F1.00	Start mode		Factory Setting	0
	Setting Options	0	Start directly	
		1	DC braking first and then start	
		2	Speed tracing and start	

0: Start directly: start from the frequency of start.

1: DC braking first and then start: DC braking first according to the set mode of F1.03 and F1.04, then start from the frequency of start.This is suitable for the occasion that the small inertial load may cause inversion at start up.

2: Speed tracing and start

The VFD will judge the rotational speed and direction of the electric motor, and then start at relevant frequency traced from the rotational speed of the electric motor, thus the rotating electric motor can start smoothly without surge. This is suitable for the occasion that the large inertial load power off suddenly and start up again.

In order to ensure the performance of speed tracing and start, accurate parameters for electric motor should be set. (See F2 group)

F1.01	Start frequency	Factory Setting	1.50Hz
	Setting Scope	0.00～10.00Hz	
F1.02	Hold time of start frequency	Factory Setting	0.0s
	Setting Scope	0.0～50.0s	

The VFD operates from the start frequency (F1.01), after the hold time of start frequency (F1.02), the VFD will accelerate to the target frequency according to the set time of acceleration. If the target frequency is lower than the start frequency, the VFD will be in standby mode. The start frequency will not be restricted by the

lower limit frequency.

In order to ensure the torque of the VFD when starting, please set appropriate start frequency. And to build up the magnetic flow when the electric motor is start, please keep the start frequency for some time and then speed up.

If the frequency reference (frequency source) is lower than start frequency, the VFD cannot start, and keep in standby mode.

When switching between forward and reverse direction of motor rotation, the hold time of start frequency will not take effect. The hold time is not included in the speed up time, but in the running time of simple PLC function.

F1.03	DC braking current before start	Factory Setting	0.0%
	Setting Scope	0.00～150.0%	
F1.04	DC braking time before start	Factory Setting	0.0s
	Setting Scope	0.0～50.0s	

DC barking before start is usually used to make the electric motor totally stop before starting.

If the starting mode is DC barking before starting, the VFD will brake in DC current according to the pre-set DC braking current, and the VFD will begin to run after the pre-set time of DC braking current. If the pre-set time of DC braking current is 0, the VFD will start directly without DC braking.

The larger DC braking current, the stronger braking force.

DC braking current before start is a percentage with respect to the rated current of the VFD.

F1.05	Stop mode	Factory Setting	1
	Setting Options	0	Deceleration to stop
		1	Coast to stop

0: Deceleration to stop

After the stop command having taken effect, the VFD will reduce output frequency in accordance with deceleration mode and the defined acceleration and deceleration time, and the VFD will stop if the frequency reduced to 0.

1: Coast to stop

After the stop command having taken effect, the VFD immediately ceases to output. The VFD will coast to stop according to mechanical inertia.

F1.06	Trigging frequency of DC braking at stop	Factory Setting	0.00Hz
	Setting Scope	0.00Hz～F0.10	
F1.07	Waiting time before DC braking at stop	Factory Setting	0.0s
	Setting Scope	0.0～50.0s	
F1.08	DC braking current at stop	Factory Setting	0%
	Setting Range	0.0～150.0%	
F1.09	DC braking time at stop	Factory Setting	0.0s
	Setting Range	0.0～50.0s	

Trigging frequency of DC braking at stop: in the process of deceleration and slowing down, as soon as the VFD reaches this frequency, it will stop and go into the process of DC braking.

Waiting time before DC braking at stop: before DC braking, the VFD ceases to output, after this delay it begins DC braking. This function is used to avoid transient fault caused by DC braking when the speed is too high.

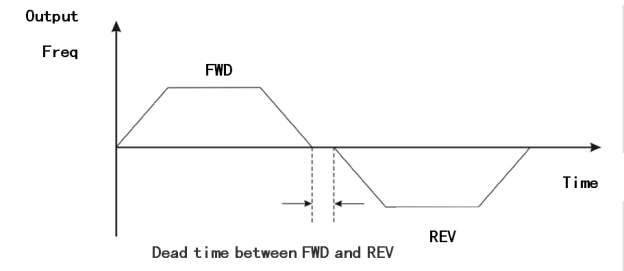
DC braking current at stop: means the added current of DC braking. The bigger current, the stronger effect of DC braking. The braking current of the power of halt is the percentage of rated current of the VFD.

DC braking time at stop: the added time for DC braking. If this value is 0, means there is no DC braking process, the VFD will stop according to the set deceleration and halt process.

F1.10	Dead-zone time between FWD and REV	Factory Setting	0.0s
	Setting Range	0.0～3600s	

The transient time at zero output frequency in the process of setting the FWD and REV transient process

As below:



Schematic Diagram of the Dead Time between FWD and REV

F1.11	Terminals control option when power on	Factory Setting	0
	Setting Options	0	Disabled
		1	Enabled

F1.12-F1.17	Reserved

F1.18	Wake-up delay time (effective in sleep and standby mode)	Factory Setting	0.0s
	Setting Range	0.0～3600s	

When F0.15=2, only if the time that the set frequency is equal or greater than the lower limit frequency exceeds the set vale of F1.18 can the VFD begin to operate.

F1.19	Restart option after power-off	Factory Setting	0
	Setting Options	0～1	

0: Restart is prohibited. This means that after powered off and powered on again, the VFD will not start automatically.

1: Restart is allowed. This means that after powered off and powered on again, the VFD will restore to the previous running status automatically. That is, if the VFD is in running status before power-off, it will delay the waiting time(F1.20) of restart after power-on next time and then start operation automatically (when controlled by terminals, the running terminals must be in closed status),if the VFD is stopped before power-off, it will not start automatically after powered on again.

F1.20	Waiting time of restart after power-off	Factory Setting	0.0s
	Setting Range	0.0～3600s	

Note: when F1.19 is 1, this setting is effective.

F1.21	Over modulation option	Factory Setting	0.0s
	Setting Range	0.0～3600s	

0:Over modulation function invalid

1:Over modulation function valid

This function is suitable for the working conditions that the VFD increases the output voltage by increasing the utilization rate of its own bus bar voltage in long term low voltage of power grid and long term overload.

5.3 F2 Group: Motor Parameters

F2.00	Drive model	Factory Setting	0
	Setting Options	0	General model (G)
		1	Pump model (P)

Note: Users can set the parameters of this group to change model type and take advantage of the combination of G/P. The 220V inverter only has General model (G).

0: Suitable for the constant torque load with the appointed parameters

1: Suitable for the variable torque load (load of draught fans, water pumps)of the appointed parameters

F2.01	Motor rated power	Factory Setting	0
	Setting Range	0.4～700.0kW	
F2.02	Motor rated frequency	Factory Setting	50.00Hz
	Setting Range	10.00Hz～F0.10	
F2.03	Motor rated rotation speed	Factory Setting	Defined by inverter model
	Setting Range	0～36000rpm	
F2.04	Motor rated voltage	Factory Setting	Defined by inverter model
	Setting Options	0～480V	
F2.05	Motor rated current	Factory Setting	Different according to inverter model
	Setting Range	0.8～2000A	

Attention
Please set the parameters according to the nameplate of the electric motor. To make sure the superior control performance of vector control, please set accurate parameters, accurate parameter identification comes from the right settings of rated parameters of the electric motor. In order to ensure control performance, please configure the electric motor according to the standards of electric motor adaption of the VFD. If the gap between motor power and the standard adaptation motor is too large, the control performance of the VFD will decline sharply.

F2.06	Motor stator resistance	Factory Setting	Defined by inverter model
	Setting Range	0.001～65.53Ω	
F2.07	Motor rotator resistance	Factory Setting	Defined by inverter model
	Setting Range	0.001～65.53Ω	
F2.08	Motor stator inductance	Factory Setting	Defined by inverter model
	Setting Options	0.1～6553mH	
F2.09	Motor rotator mutual inductance	Factory Setting	Defined by inverter model
	Setting Range	0.1～6553mH	
F2.10	Motor no-load current	Factory Setting	Defined by inverter model
	Setting Range	0.1～655.3A	

After automatic tuning of electric motor finished normally, the setting values of F2.06～F2.10 will update automatically.

Every time after changing the rated power of F2.01, the VFD will restore the standard default parameters of F2.06～F2.10.(Quadrupole Y series asynchronous motor)

If the spot situation do not allow tuning for electric motor, it is possible to refer to the known parameters of the electric motors of same type and input the parameters manually.

F2.11	Motor parameters auto-tuning	Factory Setting	0
	Setting Options	0	No autotuning
		1	Autotuning completely(no load)
		2	Static autotuning(with load)

Hint: Before tuning, make sure that the parameter of the rated power of the electric motor (F2.01～F2.05) is set correctly.

0: No autotuning, that is tuning is prohibited.

1:Autotuning completely(no load)

To ensure the dynamic control performance of the VFD, please select autotuning completely(no load), at this time, the electric motor must be in the status of no load.

After selecting rotary tuning, the VFD will conduct static autotuning(with load) first, after completion, the electric motor will accelerate to the speed of 80% of the rated frequency according to the acceleration time set in F0.18 and hold it for some time. Then the motor will decelerate to zero-speed as per the deceleration time set in F0.19, and the rotary tuning ends.

Action specification: set this function code as 1 and confirm this by pressing the button RUN, the VFD will begin to conduct rotary tuning.

2:Static autotuning(with load) is suitable for the occasions that the electric motor is not easy to break away from load and is not able to conduct rotary tuning.

Action specification: set this function code as 2 and confirm this by pressing the button RUN, the VFD will begin to conduct rotary tuning.

Tuning operation specification:

Set F2.11 as 1 or 2 and press ENT, now “RUN” is displayed and blinks, then press the button RUN to conduct parameter tuning, now the “RUN”stops blinking. Tuning finished, the stop state will displayed. In the process of tuning, press “STOP/RESET” can suspend tuning. After the completion of tuning, the value of F2.11 will restore to 0 automatically.

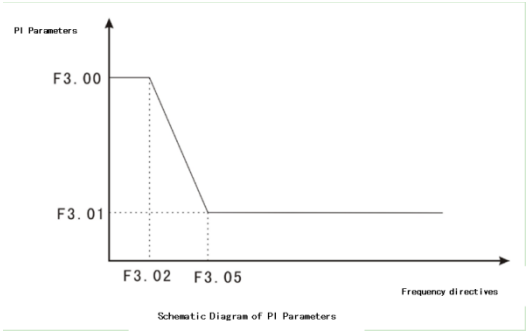
F2.12	Acceleration excitation coefficients	Factory Setting	100%
	Setting Options	40%～120%	

Under vectorial mode, by reducing this coefficients, the acceleration time can be shortened, this is suitable for occasions of light load fast acceleration.

5.4 F3 Group: Vector Control Parameters

F3.00	Proportional gain 1 of speed loop	Factory Setting	20
	Setting Options	0～100	
F3.01	Integral time 1 of speed loop	Factory Setting	0.50s
	Setting Options	0.01～10.00s	
F3.02	Low frequency point of switch	Factory Setting	5.00Hz
	Setting Options	0.00Hz～F3.05	
F3.03	Proportional gain 2 of speed loop	Factory Setting	25
	Setting Options	0～100	
F3.04	Integral time 2 of speed loop	Factory Setting	1.00s
	Setting Options	0.01～10.00s	
F3.05	High frequency point of switch	Factory Setting	10.00Hz
	Setting Options	F3.02～F0.10	

When the VFD is running at different frequency, different speed loop PI parameters can be selected. If the running frequency is lower than the value of low frequency point of switch (F3.02), the speed loop PI adjustable parameters should be F3.00 and F3.01.If the running frequency is higher than the value of high frequency point of switch (F3.05), the speed loop PI adjustable parameters should be F3.03 and F3.04. When the operation frequency is between the low frequency point of switch and high frequency point of switch, the PI parameters are linear switching of the two group PI parameters.



Schematic Diagram of PI Parameters

By adjusting the proportion coefficient and integral time of speed regulator, the dynamic response speed of vector control can be adjusted. Increase proportional gain and reduce integral time can both speed up the dynamic response of speed loop. The conditions of too large proportional or too short integral time will cause system oscillation.

Recommended adjustment method: If the factory parameters cannot meet the requirements, conduct trimming on the basis of factory parameters, firstly increase the proportional gain and ensure that the system will not oscillate, then reduce integral time so that the system owns fast response and small overshoot.

Note: Inappropriate setting of PI parameters will lead to large speed overshoot, even cause over-voltage fault when overshoot falls back.

As for no speed sensor vector control,this parameter is used for adjusting rotating speed of electric motor. When the work load of electric motor is heavy and the speed

F3.06	Coefficient of slip compensation at VC control mode	Factory Setting	100%
	Setting Options	50%～200%	

is too slow, increase this parameter, contrarily decrease this parameter.

As for speed sensor vector control,this parameter can adjust the out put current of the VFD in same workload.

F3.07	Upper limit torque	Factory Setting	150%
	Setting Options	0.0 ～200.0% (Drive rated current)	

Under speed control mode, the VFD output the maximum value of torque, set 100.0% which is correspondent to the rated output(or rated torque) current of the VFD.

F3.08-F3.09	Reserved

F3.10	Pre-alarm option when overload	Factory Setting	1
	Setting Options	0 ～4	

0：no detection

1: Overload pre-alarm is detected effective in operation (including acceleration, deceleration and constant speed), go on operation after detection

2: Overload pre-alarm is detected effective in operation (including acceleration, give alarm (E023) and stop after detection

3: Overload pre-alarm is detected effective in constant speed, go on operation after detection

4: Overload pre-alarm is detected effective in constant speed, go on operation after detection, give alarm (E023)and stop after detection

F3.11	Detecting level of pre-alarm when overload	Factory Setting	150.00%
	Setting Options	1.0~200.0% (referred to inverter rated current)	
F3.12	Detecting time of pre-alarm when overload	Factory Setting	1s
	Setting Options	0~600s	

5.5 F4 Group: V/F Control Parameters

This group of codes are only effective for V/F control(F0.00=1), but are invalid for vector control.

V/F control is fit for fans,pumps and other general loads, or the situation of one VFD drives several electric motors, or the situation that the frequency of the VFD has too much difference with that of the electric motor.

F4.00	V/F curve selection	Factory Setting	0
	Setting Options	0	Linear curve
		1	User-defined curve
		2	1.3 square torque-step-down curve
		3	1.7 square torque-step-down curve
		4	2 square torque-step-down curve

0:Linear curve, suitable for situations of ordinary constant torque load.

1:User-defined curve,suitable for special loads such as water extractor, hydro-extractor etc.Now by setting the parameters of F F4.03～ F4.08, you can get any curve about V/F relations.

2:1.3 square torque-step-down.

3:1.7 square torque-step-down.

4: 2 square torque-step-down curve.

F4.01	Torque boost	Factory Setting	3.0%
	Setting Options	0.0 %(auto) 0.1% ～30.0%	
F4.02	Torque boost cut-off frequency	Factory Setting	20.0%
	Setting Options	0.0～50.0% (relative to motor rated frequency)	

In order to make up for the feature of low-frequency torque of V/F control, do a lift makeup for the output voltage of the VFD when it is in low frequency.

If the settings for torque boost is too high, the electric motor will become too hot and the VFD will be in over-current. Generally, when setting the torque boost, do not exceed 8.0%.

Adjust this parameter effectively can avoid over-current when start up. As for large load, it is recommended to increase this parameter, and reduce this when the load is light.

When torque is increased to 0.0, the VFD will in the status of automatic torque boost, the VFD will automatically calculate the needed torque boost value according to the parameters of stator resistance etc.

Torque boost and torque cutoff frequency:under this frequency, the torque of torque boost is effective, but if exceed this set frequency, the torque boost will be invalid.

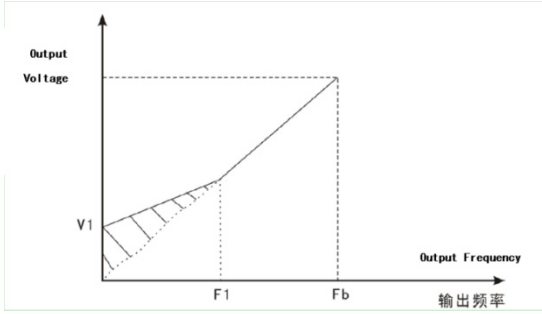


Diagram of Manual Torque Boost

V1:voltage of manual torque boost

F1:cutoff frequency of torque boost

vb: max.output voltage

Fb: The rated operating frequency

F4.03	V/F frequency 1	Factory Setting	5.00Hz
	Setting Options	0.00Hz～F4.05	

F4.04	V/F voltage 1	Factory Setting	12.0%
	Setting Options	0.0%～100.0%	
F4.05	V/F frequency 2	Factory Setting	10.00Hz
	Setting Options	F4.03～F4.07	
F4.06	V/F voltage 2	Factory Setting	26.0%
	Setting Options	0.0%～100.0%	
F4.07	V/F frequency 3	Factory Setting	20.00Hz
	Setting Options	F4.05～motor rated frequency	
F4.08	V/F voltage 3	Factory Setting	45.0%
	Setting Options	0.0%～100.0%	

The 6 parameters of F4.03～F4.08 define multistage V/F curve.

The setting values of V/F curves are determined by the load characteristics of the electric motor.

Note: the relationships of the three voltage and frequency must meet:V1<V2<V3，F1<F2<F3. When the frequency is low, high voltage setting may cause over-heating of motor or even burn the motor, and the VFD may lose speed because of over-current or get into over-current protection.

V1 ～ V3: Voltage percentage of 1～3 multistage V/F curve

F1 ～ F3: frequency point of 1～3 multistage V/F curve

Fb: rated motor frequency F2.02

F4.09	Coefficient of V/F Slip compensation	Factory Setting	0.00%
	Setting Options	0.0%～200.0%	

This is effective for V/F control. Setting this parameter can make up the speed deviation because of load in V/F control, and make sure that the speed of electric motor can remain stable when the load changes. When V/F speed deviation compensation coefficient is set as 100%, this means if the electric motor is in rated

load, the compensated speed deviation will be the rated slip of the electric motor. As for the rated speed deviation of the electric motor, the VFD will get the value by automatic calculation of the rated frequency of electric motor and rated speed of F2 group. Refer to the following principles to adjust the speed deviation coefficient:when the load is the rated load, and set the speed deviation coefficient as 100%, the rotational speed of the electric motor driven by VFD will basically close to the given speed.

F4.10	Energy-saving selection	Factory Setting		0
	Setting Options	0	Disabled	
		1	Enabled automatically	

When the electric motor is no-load or is operating in light load, by testing the load current and adjusting output voltage properly to realize the purpose of automatic energy saving.

Note:this function is specially effective for loads like fans, pumps, etc.

F4.11	Reserved

F4.12	Low-frequency threshold of restraining oscillation	Factory Setting	1
	Setting Options	0～10	

F4.13	High-frequency threshold of restraining oscillation	Factory Setting	0
	Setting Options	0～10	

Most electric motors are easy to have current oscillations when operate in some certain frequencies, some of the motors may not operate stably,or even cause over-current to the VFD. F4.16 can restrain oscillation, when set F4.12 and F4.13 into small values, the outcome of restraint will be prominent, and the current will

increase obviously, however, when set these values too high, the outcome of restraint will be weak.

F4.14	Reserved

F4.15	Boundary frequency of restraining oscillation	Factory Setting	30.00Hz
	Setting Options	0.00Hz～F0.10 (Maxi. Frequency)	

F4.15 is the demarcation point of frequency of F4.12 and F4.13.

F4.16	Reserved

F4.17	AVR function selection	Factory Setting	1
	Setting Options	0	Invalid
		1	Valid all the time
		2	Only invalid during deceleration

Under V/F control, when it is needed to stop quickly and there is no brake resistance, select “only invalid under slowdown” can greatly reduce the possibility of over voltage fault and alarm. While in the condition that brake resistance exists and there is no need to slow down quickly, please select “Valid all the time”.

5.6 F5 Group Input Terminals Parameters

The standard unit of a 8000B series VFD has 6 multi-function digit input terminals and 2 analog input terminals and 1 virtual multi-function digital input terminal.

F5.00	M1 terminal function	Factory Setting	1
F5.01	M2 terminal function	Factory Setting	2
F5.02	M3 terminal function	Factory Setting	7
F5.03	M4 terminal function	Factory Setting	0
F5.04	M5 terminal function	Factory Setting	0
F5.05	M6 terminal function	Factory Setting	0
F5.06	Reserved	Factory Setting	0
F5.07	Reserved	Factory Setting	0
F5.08	Reserved	Factory Setting	0
F5.09	Reserved	Factory Setting	0

VDI fixedly takes the output of VDO as input (that means when VDO is valid, the corresponding functions of VDI settings are valid).

These parameters are used to set the corresponding functions of digit multi-function input terminals or virtual multi-function digital input, the optional functions are as follows:

Setting Values	Functions	Descriptions
0	No function	Even has signal input, the VFD will not act. The unused terminals can be set as no function in case of preventing malfunction.
1	Run forward (FWD)	Control terminals for running forward and reverse.
2	Run reverse (REV)	
3	3-wire control	The terminal determines the operation mode of AC drive as 3-wire control. For details, please refer to the description of function code of F5.11 3-wire control.

4	Jog forward (FJOG)	FJOG is jog forward operation, RJOG is jog reverse operation. As for the frequency and the acceleration and deceleration time of jog operation, refer to the detailed description of function code of F8.00, F8.01 and F8.02.
5	Jog reverse (RJOG)	
6	Coast to stop	The VFD blocks output, the shutdown process of electric motor is not controlled by the VFD. As for large inertia loads and no requirements for the time of shutdown, this is the usual method. The definition of this method is the same as that defined in F1.05.
7	Fault reset (RESET)	External fault reset function. This function is the same as that of RESET on keyboard. Remote fault reset is implemented by this function.
8	Pause running	The VFD slows down, but all the operating parameters are in memory state, such as PLC, the swing frequency, and PID parameters. As soon as this signal disappears, the VFD returns to the status before shutdown.
9	External fault input N. O.	Set the terminal as this function, as this terminal closed, the VFD will report E015 fault and stop.
10	Frequency setting increasing(UP)	If the frequency is determined by external terminals, the terminals with the two functions are used as increment and decrement commands for frequency modification. When the frequency source is digital setting, they are used to adjust the frequency.
11	Frequency setting decreasing(DOWN)	
12	Clear UP/DOWN setting	Clear the frequency values set through UP/DOWN.
13	Frequency setting source switch between X and Y	If the present frequency source is X, switch to frequency source Y.
14	Frequency setting source switch between X and (X+Y)	If the present frequency source is X, switch to frequency source X+Y.
15	Frequency setting source	If the present frequency source is Y, switch to

	switch between Y and (X+Y)	frequency source X+Y.
16	Multi-step speed terminal 1	The setting of 16 speeds can be implemented through combinations of these four terminals. For details, please refer to annex 1.
17	Multi-step speed terminal 2	
18	Multi-step speed terminal 3	
19	Multi-step speed terminal 4	
20	Multi-step speed pause	Shield the terminal function of multi-step speed selection, and maintain the setting value to current status.
21	Acceleration/deceleration time selection terminal 1	Select 4 settings of acceleration and deceleration time by the combine of the digit status of these two terminals.
22	Acceleration/deceleration time selection terminal 2	
23	Restart simple PLC after pause	Restart the process of simple PLC and clear up the memory information of the previous PLC
24	Simple PLC pause	Executing process of simple PLC pauses, operate all the time at the current speed
25	PID pause	PID is invalid temporarily, the VFD maintains the present output of frequency, will not adjust by PID.
26	Swing frequency pause (maintain at current frequency)	The VFD maintains temporarily at the present output of frequency
27	Reset after swing frequency pause (reset to central frequency)	The frequency of the VFD resets to central frequency
28	Counter reset	This will clear up the status of counter
29	Reserved	
30	Acceleration/deceleration prohibited	Keep the VFD not influenced by outer signals(except the stop command), maintains the present output frequency.
31	Counter triggering	
32	Clear UP/DOWN setting	When the terminal is closed, this can clear up the

	temporarily	set frequency of UP/DOWN; when the terminal is disconnected, it will go back to the frequency of UP/DOWN setting.
33	Reserved	
34	Length counting input	Length counting by the input signal. If the signal of counting input is a pulse signal, it is needed to transfer it into a discrete signal by a relay(the frequency of input signal should be lower than 200Hz)
35	Length counting clear up	Clear up the present values of counting meter
36	Control command source switching	When the terminal is defined as this function, and when terminal input is switching, it can select command source between keypad command and terminal command.
37	Terminal input delay output	When the terminal is defined as this function, the close time of this terminal exceeds the setting value of F8.21, and the function of the digital output such as relay is defined as 16, the digital output will be activated as closed, or it will disconnect
38	Toggling PID control characteristic (F9.03)	Toggling PID control characteristic of F9.03, to take reverse control action compared with before.
39	Switching PID parameters	Switching PID parameters by a multi-function digital input terminal, with command from outside controller.
40	Pausing PID integration	When it is needed in some situation, such as smoothing the control effects when deviation is small, PID integration can be paused by multi-function terminal.
41	Output DC brake	When the terminal is defined as this function and when the terminal is activated, VFD outputs the current as the setting of F1.03

Attached Table 1- Instruction of Multi-step speed

K_4	K_3	K_2	K_1	Frequency setting	Corresponding parameters
OFF	OFF	OFF	OFF	Multi-step speed 0	FD.02
OFF	OFF	OFF	ON	Multi-step speed 1	FD.04
OFF	OFF	ON	OFF	Multi-step speed 2	FD.06
OFF	OFF	ON	ON	Multi-step speed 3	FD.08
OFF	ON	OFF	OFF	Multi-step speed 4	FD.10
OFF	ON	OFF	ON	Multi-step speed 5	FD.12
OFF	ON	ON	OFF	Multi-step speed 6	FD.14
OFF	ON	ON	ON	Multi-step speed 7	FD.16
ON	OFF	OFF	OFF	Multi-step speed 8	FD.18
ON	OFF	OFF	ON	Multi-step speed 9	FD.20
ON	OFF	ON	OFF	Multi-step speed 10	FD.22
ON	OFF	ON	ON	Multi-step speed 11	FD.24
ON	ON	OFF	OFF	Multi-step speed 12	FD.26
ON	ON	OFF	ON	Multi-step speed 13	FD.28
ON	ON	ON	OFF	Multi-step speed 14	FD.30
ON	ON	ON		Multi-step speed 15	FD.32

Attached Table 2 Instruction of Acceleration/Deceleration Time

Terminal 2	Terminal 1	Seletion of accleration/deceleration time	Corresponding parameters
OFF	OFF	Acceleration time1	F0.18、F0.19
OFF	ON	Acceleration time2	F8.03、F8.04
ON	OFF	Acceleration time3	F8.05、F8.06
ON	ON	Acceleration time4	F8.07、F8.08

F5.10	On/off filter times	Factory Setting	5
	Setting Options	1～10	

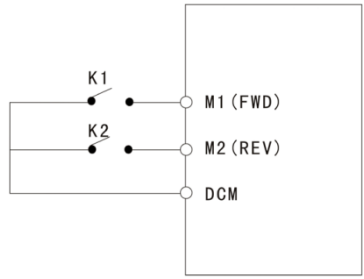
Sensitivity setting of the multi-function digital input terminals. If the digital input terminals are interfered and result in malfunction in some cases, increase this parameter setting for better anti-interference, but maybe the terminal sensitivity will then decrease also.

F5.11	Terminal control mode	Factory Setting	0
	Setting Options	0:2-wire control mode 1	
		1:2-wire control mode 2	
		2:3-wire control mode 1	
		3:3-wire control mode 2	

This parameter defines 4 control modes of VFD by terminal inputs.

0: 2-wire control mode 1. This mode is the most usual one. By terminal command of M1(FWD) and M2(REV), the motor will run forward or reversed as shown in the following table and wiring diagram.

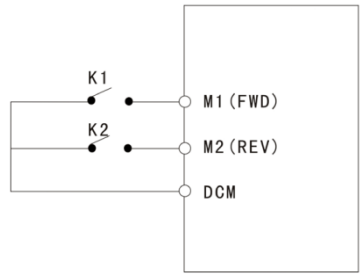
K1	K2	Motor Control
OFF	OFF	STOP
ON	OFF	FORWARD
OFF	ON	REVERSE
ON	ON	STOP



2-wire control mode 1

1: 2-wire control mode 2. In this mode，M1(FWD) is the enable terminal and the direction is determined by M2(REV).

K1	K2	Motor Control
OFF	OFF	STOP
OFF	ON	STOP
ON	OFF	FORWARD
ON	ON	REVERSE

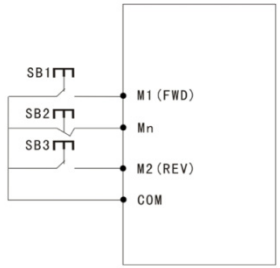


2-wire control mode 2

2: 3-wire control mode 1. In this mode，Mn is the enable terminal and the direction is controlled respectively by M1(FWD), M2(REV).

To start a motor, close and enable Mn terminal, then with the rising edge of pulse input of M1 or M2 terminals, the motor will run forward or reverse.

To stop VFD, it should be done by disconnecting Mn terminal input signal.



3-wire control mode 1

Note:

SB1: FWD switch

SB2: STOP switch

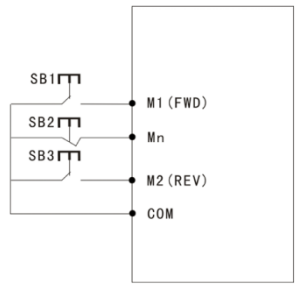
SB3: REV switch

Mn is one of the multi-function digital input terminals, and its corresponding terminal function should be set as 3, which means “3-wire control mode”.

3: 3-wire control mode 2. In this mode， Mn is the enable terminal. The running command is controlled by M1(FWD) and the direction is controlled by M2(REV).

To start a motor, close and enable Mn terminal, the rising edge of pulse input of M1 is for running command, and M2 input is for direction control.

The STOP command is done by disconnecting Mn terminal signal.



3-wire control mode 2

Note:

SB1: RUN switch

SB2: STOP switch

SB3: FWD/REV switch

Mn is one of the multi-function digital input terminals, and its corresponding terminal function should be set as 3, which means “3-wire control mode”.

F5.12	Frequency changing rate through UP/ DOWN terminal adjusting	Factory Setting	0.50Hz/s
	Setting Options	0.01~50.00Hz/s	

This parameter is used to adjust the frequency changing rate of terminal UP/DOWN; the rate unit is Hz/s.

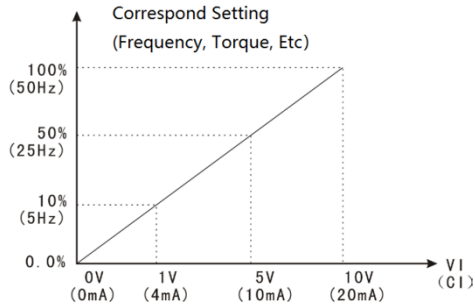
F5.13	AVI lower limit	Factory Setting	0.00V
	Setting Options	0.00V～10.00V	
F5.14	Setting value corresponding to AVI lower limit	Factory Setting	0.0%
	Setting Options	-100.0%～100.0%	

F5.15	AVI upper limit	Factory Setting	10.00V
	Setting Options	0.00V～10.00V	
F5.16	Setting value corresponding to AVI upper limit	Factory Setting	100.0%
	Setting Options	-100.0%～100.0%	
F5.17	AVI input filter time	Factory Setting	0.10s
	Setting Options	0.00s~10.00s	
F5.18	ACI lower limit	Factory Setting	4.00mA
	Setting Options	0.00mA～20.00mA	
F5.19	ACI lower limit corresponding to setting value	Factory Setting	0.0%
	Setting Options	-100.0%～100.0%	
F5.20	ACI upper limit	Factory Setting	20.00mA
	Setting Options	0.00V～10.00V	
F5.21	ACI upper limit corresponding to setting value	Factory Setting	100.0%
	Setting Options	-100.0%～100.0%	
F5.22	ACI input filter time	Factory Setting	0.10s
	Setting Options	0.00s~10.00s	

These parameters are used to define the relationship between the analog input and the corresponding setting. When the analog input exceeds the scope between the defined upper and lower input limits, the analog value is calculated as the upper or lower input limits reached.

When the analog input is current input, 1 mA current corresponds to 0.5 V voltage. In different applications, 100% of analog input corresponds to different nominal values. For details, refer to the description of different applications.

The following examples illuminate the setting situations.



Analog Input and Correspond Setting

F5.23	M1 On delay	Factory Setting	0.0s
	Setting Options	0.0s ～ 6000.0s	
F5.24	M1 Off delay	Factory Setting	0.0s
	Setting Options	0.0s ～ 6000.0s	
F5.25	M2 On delay	Factory Setting	0.0s
	Setting Options	0.0s ～ 6000.0s	
F5.26	M2 Off delay	Factory Setting	0.0s
	Setting Options	0.0s ～ 6000.0s	
F5.27~F5.30	Reserved		
F5.30	VDI On delay	Factory Setting	0.0s
	Setting Options	0.0s ～ 6000.0s	
F5.32	VDI Off delay	Factory Setting	0.0s
	Setting Options	0.0s ～ 6000.0s	

On delay of digital input terminal means the delay time for the setting function of the input terminal to take effect after the input switch is closed.

Off delay of digital input terminal means the delay time for the setting function of the input terminal not to take effect after the input switch is opened.

5.7 F6 Group Output Terminals Parameters

8000B series VFD provides 1 multifunctional digital output (with optical coupler), 1 multifunctional relay output, 2 multifunction analog outputs, and 1 virtual multifunctional digital output.

F6.00	MO1 output selection	Factory Setting	1
F6.01	VDO output options (For input of VDI)	Factory Setting	0
F6.02	Relay 1 output selection	Factory Setting	3
F6.03	Reserved		

The function options for the multifunctional digital and relay outputs are shown as following table:

Setting value	Function	Instructions
0	No output	The terminal has no function.
1	VFD FWD running	When the VFD is in FWD running status, the output becomes ON.
2	VFD REV running	When the VFD is in REV running status, the output becomes ON.
3	Fault output	When the VFD stops due to a fault, the output becomes ON.
4	Frequency detecting level FDT output	For details, please refer to F8.12,F8.13
5	Frequency reached	For details, please refer to F8.14
6	Running at zero speed	If the VFD runs with the output frequency of 0, the output becomes ON.
7	Upper limit frequency reached	If the running frequency reaches the upper limit, the output becomes ON.
8	Lower limit frequency reached	If the running frequency reaches the lower limit, the output becomes ON.
9	Frequency setting value less than lower limit frequency	When the selected frequency reference is less than the frequency lower limit, the output becomes ON.
10	FDT reached	When the selected frequency reference reach the FDT level, the output becomes ON.
11	Accumulative running time reached	If the accumulative running time of the VFD exceeds the time set in F8.17, the output becomes

Setting value	Function	Instructions
		ON.
12	PLC cycle completed	When simple PLC operation completes one cycle, the output becomes on as a pulse signal with width of 250 ms.
13	VFD overload pre-alarm	The output becomes ON after the pre-alarm time as the VFD reaching pre-alarm threshold value.
14	User Customized Output	Users can customize the output function, refer to F6.14~f6.18
15	Running frequency detection	When the running frequency is less or equal to the setting of F8.22, or is larger or equal to the setting of F8.23, the output becomes ON; When the output frequency is between F8.22 and F8.23, the output becomes OFF.
16	Terminal input delay output	As a multifunction digital input is set as the function of Terminal Input Delay Output, if the time-lasting exceeds the time setting of F8.21 after input is closed, the output becomes ON.
17	VFD stand-by	When the VFD is Power on and is in STOP status without any fault occurring (include LU fault, the output becomes ON; After the VFD turns into running, or there is a fault, the output becomes OFF.

F6.04	FM output selection	Factory Setting	0
F6.09	AM output selection	Factory Setting	0

The signal scope of analog output AM and FM is 0V~10V or 0mA~20mA.

The analog output scope calibration is as following table.

Setting value	Function	Analog output 0.0%~100.0% Corresponding value
0	Running frequency	0~Maximun output frequency
1	Setting frequency	0~Maximun output frequency
2	Running rotation speed	0~Running rotation speed correspond to maximum output frequency

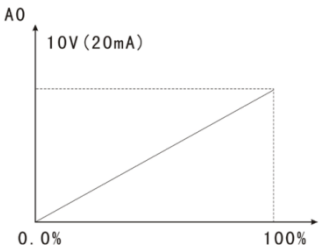
Setting value	Function	Analog output 0.0%~100.0% Corresponding value
3	Output current	0~2 times of motor rated current
4	Output voltage	0~1.2 times of VFD rated voltage
5~7	Reserved	
8	Analog AVI input value	0~10V
9	Analog ACI input value	0~10V(Or 0~20mA

F6.05	FM output lower limit	Factory Setting	0.0%
	Setting Options	0.0~100.0%	
F6.06	FM lower limit corresponding to output	Factory Setting	0.00V
	Setting Options	0.00V~10.00V	
F6.07	FM output upper limit	Factory Setting	100.0%
	Setting Options	0.0~100.0%	
F6.08	FM upper limit corresponding to output	Factory Setting	10.00V
	Setting Options	0.00V~10.00V	
F6.10	AM output lower limit	Factory Setting	0.0%
	Setting Options	0.0~100.0%	
F6.11	AM lower limit corresponding to output	Factory Setting	0.00mA
	Setting Options	0.00mA-20.00mA	
F6.12	AM output upper limit	Factory Setting	100.0%
	Setting Options	0.0~100.0%	
F6.13	AM upper limit corresponding to output	Factory Setting	20.00mA
	Setting Options	0.00mA-20.00mA	

The above function codes define the corresponding relation between the FM/AM output range and the analog output signal limits. When the output exceeds the scope between the defined upper and lower input limits, the analog output signal is calculated as the upper or lower input limits reached.

When the analog output is current output, 1mA current corresponds to 0.5V voltage.

In different applications, 100% of analog output corresponds to different nominal values. For details, refer to the description of different applications.



FM/AM Output and Analog Signal

F6.14	User defined output variability option (EX)	Factory Setting	0
	Setting Options	0:Running frequency 1:Setting frequency 2:DC bus voltage 3:Output current 4:Output voltage 5:Sign of start and stop status 6:Sign of control status 7:Counter value 8:Counting meter value 9:Inverter module temperature 10:AVI input value 11:ACI input value	

This parameter is used as the selection of reference variable for the user defined output. The selected EX is used as the comparison value.

F6.15	Comparison method of user defined output	Factory Setting	0
	Setting Options	Units digit: comparison test method 0: Equal (EX==X1) 1: Equal or greater than 2: Equal or less than 3: Interval comparison (X1≤EX≤X2) 4:Bits test (EX&X1=X2) Tens digit : output method 0: False value output 1: True value output	

Unit digit selection defines the comparison method: Take the variable selected by F6.14 as the test object and compare it with the comparison value set by F6.17 and F6.18.

Tens digit selection defines output method: Selection of the false or true value output mode. The false value output mode means if it cannot meet the comparison condition, it will output, and if it can meet the condition it won't output. The true value output mode means if it can meet the comparison condition, it will output, and if it cannot meet the condition it won't output.

F6.16	User defined output dead zone	Factory Setting	0
	Setting Options	0~65535	

When the comparison method of F6.15 is greater than /equal to or less than or equal to, F6.16 is used to define the dead zone that take comparison value X1 as zone center. The dead zone only takes effect for F6.15 comparison method 1 and 2, not for method 0, 3 and 4. For example, When F6.15 is set as 11, as the EX increases from zero and become greater than or equal to X1 + F6.30, the output is valid; when the EX decreased until less than or equal to X1.F6.30, output is invalid.

F6.17	Output comparison value X1	Factory Setting	0
	Setting Options	0~65535	
F6.18	Output comparison value X2	Factory Setting	0
	Setting Options	0~65535	

This two parametersis used to set the comparison value of user-defined output.

The following is an example of user-defined output:

1. When the setting frequency is require to be greater than or equal to 20.00HZ, the relay is closed;

Set the parameters as follows: F6.02 = 14, F6.28 = 1, F6.15 = 11, F6.16 = 0, F6.31 = 2000;

2. When the bus voltage is require to be less than or equal to 500.0V, the relay is closed;In order to avoid relay operates frequently when the detection voltage fluctuate ±5V at 500.0V, it requires to process the dead intervalwithinthe range of (500.0-5.0) - (500.0 + 5.0) .

Set the parameters as follows: F6.02 = 41, F6.28 = 2, F6.29 = 01, F6.30 = 50, F6.31 = 5000;

3. When the AC drive is reversed, the relay is closed:

Set the parameters as follows: F6.02 = 41, F6.28 = 5, F6.29 = 14, F6.31 = 8, F6.32 = 8;

4. When AI1 input is greater than 3.00V and less than or equal to 6.00V, the relay is closed:

Set the parameters as follows: F6.02 = 41, F6.28 = 13, F6.29 = 13, F6.31 = 300, F6.32 = 600

5.8 F7 Group Display Interface Parameters

F7.00	User Password	Factory Setting	0
	Setting Options	0~9999	

The password protection will take effect after this parameter is set as a non zero digit.

0000: Clear the password being set before, and disable password protection; Restoring factory setting can also clear password.

After password is set and has take effect, if the password isn't correct, user can not enter parameter menu display. Only give a correct password to enter parameter display and edition mode. The password being set must be keep in mind.

Password protection will take effect 1 minute after withdrawing from parameter edition mode. While the password protection has been enabled, "0.0.0.0" will be displayed first as the PRGM is pressed for entering parameter edition mode. Password must be input correctly, or the edition mode will never been enabled.

F7.01	Parameter group hiding	Factory Setting	0000
	Setting Options	0000~FFFF	

This parameter is for user to hide the designated group(s) of parameters and not be displayed.

Example: With setting value 0003, it means F0 and F1 groups are hidden.

F7.02	Reserved

F7.03	REV/JOG key function	Factory Setting	2
	Setting Options	0:Switch display status 1:Clear UP/DOWN setting 2:Reverse running 3:Forward jog running 4:Quick debugging mode	

		5: Command Source Switching between Keypad and outer source(terminal or communication)	
F7.04	STOP/RESET key stop function	Factory Setting	0
	Setting Options	0:Only valid for keypad setting 1:Valid for both keypad setting and terminals setting 2:Valid for both keypad setting and communication interface setting 3:Valid for all control mode	

F7.05	Reserved

F7.06	Running status display selection 1	Factory Setting	35
	Setting Options	0~0xFFFF BIT0:Running frequency BIT1:Setting frequency BIT2:DC bus voltage BIT3:Output voltage BIT4:Output current BIT5:Running speed BIT6:Linear speed BIT7:Reserved BIT8:Reserved BIT9:PID setting value BIT10:PID feedback value BIT11:Input terminals status BIT12:Output terminals status BIT13:Reserved BIT14:Counter value BIT15:Current step of multi-step speed and PLC	
F7.07	Running status display selection 2	Factory Setting	0
	Setting Options	1~0xFFFF BIT0:AVI value BIT1: ACI value BIT2:Reserved BIT3: Motor overload ratio	

		BIT4: Inverter overload ratio BIT5:Running time BIT6:Counting meter value BIT7~BIT15: Reserved	
F7.08	Stop status display selection	Factory Setting	3
	Setting Options	0~0xFFFF BIT0: Setting frequency BIT1: DC bus voltage BIT2:Input terminal status BIT3:Output terminal status BIT4:PID setting value BIT5:PID feedback value BIT6:AVI value BIT7:ACI value BIT8:Reserved BIT9: Current step of multi-step speed and PLC BIT10:Reserved BIT11:Counting meter value BIT12~BIT15:Reserved	

While the VFD is in running or stop status, monitoring of status data will be defined by these parameters which are binary numbers in 16bits. If any of the bits is set as 1, the corresponding status data can be selected and monitored by《 Key. If the bit is set as 0, the corresponding status data cannot be monitored. Note: Convert binary number into hexadecimal number before setting parameters of F7.06~F7.08.

Note: Digital input and output terminal status is displayed in decimal number, with M1(MO1) as the lowest bit. For example, as digit input status is displayed as 3, it represents M1 and M2 are both closed, with other terminals opened.

F7.09	Inverter module temperature	0~100℃
F7.10	Inverter software version	*.**
F7.11	Accumulative running time	0~9999h
F7.12	Accumulative power-on time	0~9999h
F7.13	Reserved	

These parameters can only be checked and cannot be modified.

Inverter module temperature: displays the IGBT module temperature. Different model has different IGBT over-temperature threshold.

Inverter software version: DSP embedded software version.

Accumulative running time: displays the accumulative running time as the VFD has recorded.

Accumulative power-on time: displays the accumulative power-on time as the VFD has recorded.

5.9 F8 Group Auxiliary Function Parameters

F8.00	Jog running frequency	Factory Setting	5.00Hz
	Setting Options	0.00~F0.10	
F8.01	Jog running acceleration time	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	
F8.02	Jog running deceleration time	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	

These parameters define the jogging frequency, acceleration and deceleration time. The jogging procedure is according to start mode F1.00=0(Start directly) and Stop mode F1.05=0(Decelerate to stop).

Jog running acceleration time is the interval time for the VFD to accelerate from 0Hz to max. output frequency(F0.10).

Jog running deceleration time is the interval time for the VFD to decelerate from max. output frequency(F0.10) to 0Hz.

F8.03	Acceleration time 2	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	
F8.04	Deceleration time 2	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	
F8.05	Acceleration time 3	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	
F8.06	Deceleration time 3	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	
F8.07	Acceleration time 4	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	
F8.08	Deceleration time 4	Factory Setting	Defined by inverter model
	Setting Options	0.1~3600s	

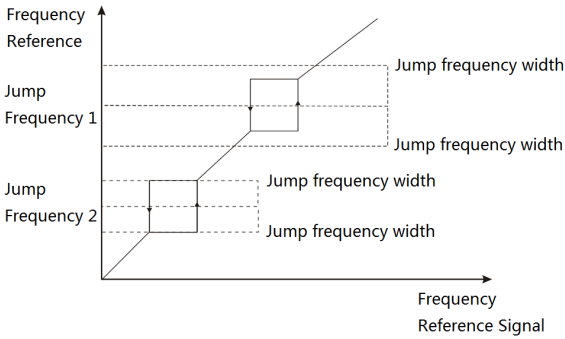
For the VFD acceleration and deceleration time, there are F0.18 and F0.19 and the above-mentioned three pairs of acceleration and deceleration time, all these have the same definition. Please refer to the descriptions of parameter F0.18 and F0.19.

During the operation of AC drive, acceleration/deceleration time1~4 can be chosen through combinations of multi-function digital input terminals. For more details, see the descriptions of function code 21 and 22 for parameter F5.01 to F5.05.

F8.09	Jump frequency 1	Factory Setting	0.00Hz
	Setting Options	0.00~F0.10	
F8.10	Jump frequency 2	Factory Setting	0.00Hz
	Setting Options	0.00~F0.10	
F8.11	Jump frequency width	Factory Setting	0.00Hz
	Setting Options	0.00~F0.10	

If the frequency reference is within the frequency jump range, the actual running frequency will be the jump frequency boundary close to the frequency reference.

Setting the jump frequency helps to avoid the mechanical resonance point of the load. These series VFD supports two jump frequencies. If both are set to 0, the frequency jump function is disabled.

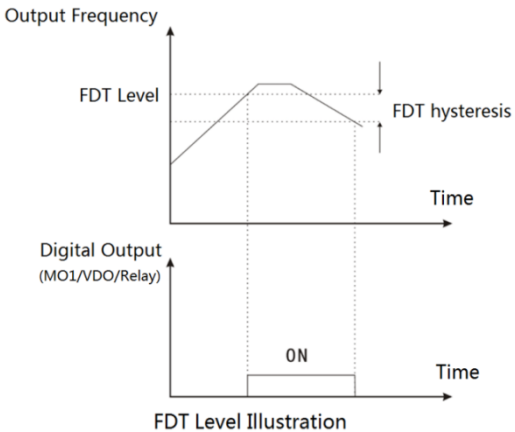


Jump Frequency Illustration

F8.12	Frequency detection value(FDT)	Factory Setting	50.00Hz
	Setting Options	0.00~F0.10	
F8.13	FDT hysteresis	Factory Setting	5.00%
	Setting Options	0.0~100.0%	

When the running frequency is higher than frequency detection value, VFD digital output is ON if its corresponding parameter is set as function code 4 through F6.00~F6.02. When the running frequency is lower than frequency detection value minus FDT hysteresis, VFD digital output is OFF.

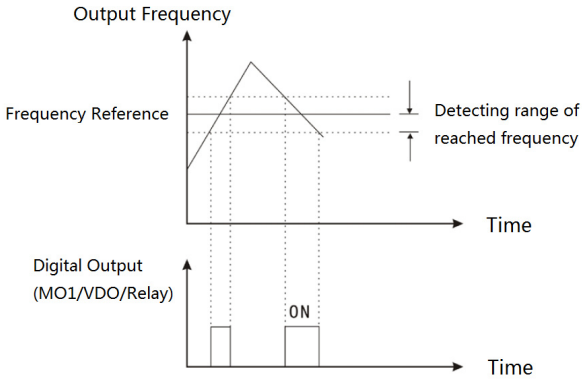
The above-mentioned parameters are detection point and OFF hysteresis. Parameter F8.18 setting value is as the percentage of frequency detection value F8.12.



FDT Level Illustration

F8.14	Detecting range of reached frequency	Factory Setting	0.00%
	Setting Options	0.0~100.0% (Max. frequency)	

When the running frequency is within the detecting range of frequency reference, VFD digital output is ON if its corresponding parameter is set as function code 10 through F6.00~F6.02. This parameter is for setting the detecting range of reaching frequency reference, and the value is the percentage to the maximum frequency, as the following illustration.



Detecting Range of Reached Frequency

F8.15	Braking threshold voltage	Factory Setting	120.00%
	Setting Options	115.0~140.0% (Standard DC bus voltage)	

This parameter is the setting of the bus voltage for starting braking. It is for efficiently load braking.

F8.16	Speed display coefficient	Factory Setting	100.00%
	Setting Options	0.1~999.9%	

Adjust this parameter for calibrating rotation speed display.

F8.17	Option as running time reached	Factory Setting	0

Settings of what kind of action will be taken as the running time reached.

0: Keep running

1: Stop

F8.18	Running time setting	Factory Setting	9999
	Setting Options	0~9999h	

F8.19	Droop control	Factory Setting	0.00Hz
	Setting Options	0.00Hz~10.00Hz	

This function is for the load leveling in the case of one load driving by several motors.

The droop control refers to the load leveling method, which begins while the load is increasing, and thus the VFD will decrease the output frequency and cut down the load of the corresponding motor which actually has heavier load than others driving the same load, and thus result in even load among motors.

This parameter refers to the lowing rate of VFD output frequency while in droop control mode.

F8.20	Panel potentiometer filter time selection	Factory Setting	0.10s
	Setting Options	0.00~10.00s	

This parameter is for the setting of filter time of panel potentiometer, and if the time setting is too long the reacting of frequency reference will be too slow, or if the time setting is too short the frequency will be fluctuating as the result of interference.

F8.21	Output delay time selection	Factory Setting	0.0s
	Setting Options	0~9999s	

When the multi-function digit input terminals are defined as “terminal input delay output”, this parameter is used to define the delay time for the output function.

F8.22	Lower limit of frequency detecting	Factory Setting	20.00Hz
	Setting Options	0.00~Maxi. frequency	
F8.23	Upper limit of frequency detecting	Factory Setting	40.00Hz
	Setting Options	0.00~Maxi. frequency	

When the multi-function digit output terminals are defined as “Running frequency detection”, these two parameters are used to define the upper and lower limits for the frequency detecting. If the running frequency is less or equal to F8.22(Lower limit of frequency detecting), or is greater or equal to F8.23(Upper limit of frequency detecting), the corresponding multi-function digit output terminal will be “ON”; If the running frequency is between F8.22 and F8.23, the terminal will be “OFF”.

F8.24	Reserved

F8.25	Inverter rated power	Factory Setting	Defined by inverter model
	Setting Options	0.4~700.0kW	
F8.26	Inverter rated current	Factory Setting	Defined by inverter model
	Setting Options	0.0~2000A	

These parameters are for the reference of the rated power and rated current, not for modification.

F8.27	Linear speed display coefficient	Factory Setting	1.00%
	Setting Options	0.1~ 999.9% (linear speed = mechanical speed * F8.27)	

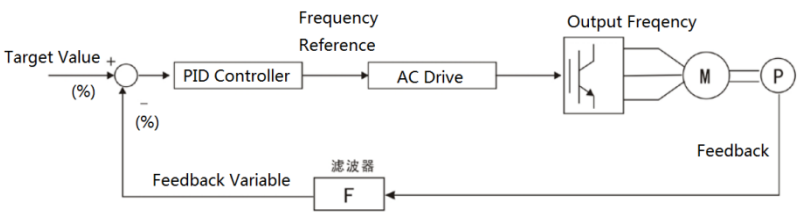
Linear speed = mechanical revolution * F8.27. This parameter is for the calibration

of linear speed display.

F8.28~F8.29	Reserved

5.10 F9/FE Group PID Control Parameters

PID control is a general method that is used for process control. By performing proportional, integral and differential operations on the difference between the feedback variable and the target value, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled variable around the target value. It is applied to process control such as flow control, pressure control and temperature control. The principle block diagram of PID control is as follows:



F9.00	PID setting source		Factory value	0
	Setting range	0	Keypad Preset value(F9.01)	
		1	Analog terminal AVI	
		2	Analog terminal ACI	
		3	Communication setting	
		4	Multi-step speed input terminals	

When the frequency reference selection is PID, namely F0.03 is selected as 8, this function is enabled. This parameter determines the given channel of process PID target value.

The target amount of process PID is a relative value, setting 100% corresponds to 100% of the feedback signal in controlled system; The system will conduct the

calculation based on relative values (0 to 100%).

Note: Multi-step speed input terminals can be achieved by relative settings of FD parameter group, and the settings are not frequency but the relative values in percentage of the feedback's full range.

F9.01	PID preset value	Factory Setting	0.00%
	Setting Options	0.0%~100.0%	

Select F9.00=0, namely the target reference is keypad setting. This parameter needs to be set. The base value of this parameter is the feedback reference of this system.

F9.02	PID feedback selection		Factory value	0
	Setting range	0	Analog terminal AVI	
		1	Analog terminal ACI	
		2	AVI+ACI	
		3	Communication interface	

Select PID Feedback Channel by this parameter.

Note: Do not select the target and feedback channel as the same one, or the PID controller will not be effect.

F9.03	PID control characteristic		Factory value	0
	Setting range	0	Positive	
		1	Negative	

0: PID control is positive. When the feedback value is greater than the PID setting, the AC drive's output frequency will decrease to let the feedback system reaching a new balance. For example, a winding tension control requires positive PID controlling.

1: PID control is negtive. When the feedback value is greater than the PID setting,

the AC drive's output frequency will increase to let the feedback system reaching a new balance. For example, the unwinding tension control requires negtive PID controlling.

F9.04	Proportional gain (Kp1)	Factory Setting	20.0%
	Setting Options	0.0~100.0%	
F9.05	Integral time (Ti1)	Factory Setting	2.00s
	Setting Options	0.01~10.00s	
F9.06	Differential time (Td1)	Factory Setting	0.00s
	Setting Options	0.00~10.00s	
FE.00	Proportional gain (Kp2)	Factory Setting	20.0%
	Setting Options	0.0~100.0%	
FE.01	Integral time (Ti2)	Factory Setting	2.00s
	Setting Options	0.01~10.00s	
FE.02	Differential time (Td2)	Factory Setting	0.00s
	Setting Options	0.00~10.00s	

Proportional gain(Kp1, Kp2): It decides the regulating intensity of the PID regulator. The higher the Kp is, the larger the regulating intensity is. The value 100.0 indicates when the deviation between PID feedback and PID setting is 100.0%, the adjustment amplitude of the PID regulator on the output frequency reference is the maximum frequency.

Integral time(Ti1, Ti2): It decides the integral regulating intensity of PID controller by the difference between the feedback variable and the target value. The integral time refers to the time when the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time to let hen the adjustment amplitude reaches the maximum frequency. The shorter the integral time is, the largerthe regulating intensity is.

Differential time (Td1, Td2): It decides the regulating intensity of the PID controller on the deviation changing rate between feedback and target. Differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency. The longer the differential time is, the larger the regulating intensity is.

PID is the most commonly used control algorithm in process control, the effect are different to each part of the algorithm. The following is a brief introduction to the algorithm principle and commissioning procedure.

Proportional Control(P): With a deviation appears between PID feedback and setting, PID controller will give an output proportional to the deviation. If the deviation is stable, the output is also stable. Proportional control can respond rapidly to the fluctuation of feedback. But with proportional control only, it cannot achieve zero-deviation control. The higher the proportional gain is, the faster the regulating speeds is, but if the gain is too high it will result in oscillation. To commission the proportional control, first it is needed to set the integral time to the longest value, and the differential time to zero. Only use proportional control to let the system start operating, and then adjust the PID setting to monitor the deviation between feedback and setting(static error). If the static error keeps in the direction of PID setting adjustment(i.e. As increasing the PID setting, and the feedback is always less than the setting after the system reaching a stable state), then it is needed to increase the proportional gain, or it is needed to decrease the gain. Repeat this procedure until the static error is fairly small(it is hard to get rid off static error).

Integral Control (I): With a deviation appears between PID feedback and setting, PID controller will give an output which is accumulating continuously. If the deviation exists, the output of adjustment will keep on increasing, until the deviation disappears. Integral control can eliminate static errors effectively. With the integral control getting too strong, repeating overshoot will appear, resulting in unstable state of system and finally oscillation. The feature of oscillation under strong integral control is the PID feedback will swing around the PID setting, and the amplitude will keep on increasing until oscillating happen. For adjustment of the integral time, it is commonly modified from long to short, step by step, while

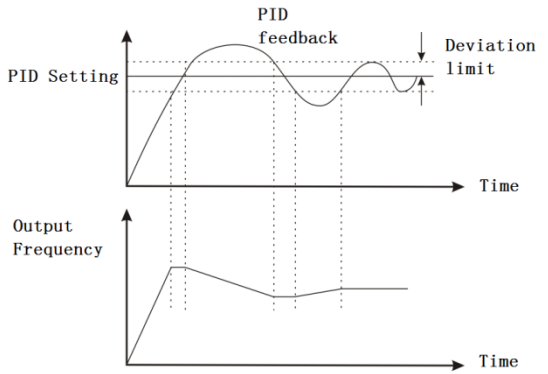
monitoring the effect of adjustment, until it meets the requirement of speed to become stable.

Differential Regulation (D): When the deviation between PID feedback and setting is varying, PID controller will give an output which is proportional to the varying rate of deviation. The output will be relative to varying rate and direction of the deviation only, not the deviation's direction and value. The effect of differential regulation is to regulate the system by the varying trend of feedback signal. Thus it will control the variation of feedback signal. Differential regulation should be used with extreme caution, because it could easily lead to the amplification of system interference, especially the interference in high frequency.

F9.07	Sampling period (T)	Factory Setting	0.10s
	Setting Options	0.01~100.0s	
F9.08	PID control deviation limit	Factory Setting	0.00%
	Setting Options	0.0~100.0%	

Sampling period(T): It refers to the sampling period of feedback signal, and the PID control calculates once a sampling period. The longer the sampling period is, the slower the response time.

PID control deviation limit: The limit of PID feedback deviation to PID setting value, which is for the PID control output as in following illustration. Between the upper and lower PID control deviation limit, PID control will stop regulating. Make proper setting of this parameter will result in accuracy, stability of PID control response.



PID Control Deviation Limit and PID Output

F9.09	Feedback loss detecting value	Factory Setting	0.00%
	Setting Options	0.0~100.0%	
F9.10	Feedback loss detecting time	Factory Setting	1.0s
	Setting Options	0.0~3600.0s	

Feedback lost detecting value: This value corresponds to the full range(100%), and the system always keep on monitoring the PID feedback value. As the feedback value is less or equal to the feedback lost detecting value, a timing process is trigged to start. If the timing is exceeds the feedback lost detecting time, the system will display an alarm code indicating PID feedback lost.

F9.11	PID sleep function option		Factory value	0
	Setting range	0	PID normal working	
		1	PID sleep	

0: The VFD runs with normal PID control operation, the sleep function is disabled.

1: The VFD runs with sleep PID control operation, the sleep function is enabled.

F9.12	PID sleep detecting delay time	Factory Setting	3.0s
	Setting Options	0.0~3600.0s	
F9.13	PID wake-up threshold	Factory Setting	0.00%
	Setting Options	0.0~100.0%	
F9.14	PID wake-up detecting delay time	Factory Setting	3.0s
	Setting Options	0.0~3600.0s	
F9.15	Lower retaining frequency of PID sleep detecting	Factory Setting	10.00Hz
	Setting Options	0.00Hz~20.00Hz	

As PID sleep is selected, VFD keeps on monitoring the feedback and compares it to the PID setting. If feedback is higher than setting, VFD will start sleep detecting. Then after PID sleep detecting delay time and if the feedback is still higher than setting, VFD will decrease output frequency gradually until Lower retaining frequency of PID sleep detecting, and keep PID Lower retaining frequency running time at this retaining frequency. If the feedback is still higher than the setting, VFD will decrease output frequency to 0Hz and enter sleeping mode. During the above process, if the feedback is lower than the setting, sleep detecting will be fail and VFD returns to PID control mode. While in sleeping mode, if the feedback is lower than PID wake-up threshold, VFD will start PID wake-up detecting. After PID wake-up detecting delay time, if the feedback is still lower than wake-up threshold, wake-up will be success and VFD returns to PID control mode, or it is fail for wake-up. If the setting of PID wake-up threshold is too high it will result in VFD restarting freqenctly, or if it is too low it will result in too low pressure of output.

F9.16	PID Lower retaining frequency running time	Factory Setting	10.0s
	Setting Options	0.0~3600.0s	
F9.17	PID sleep threshold	Factory Setting	80.0s

	Setting Options	F9.13~100.0%

When F9.11 setting is PID sleep mode, VFD continues verifying PID feedback to find if it is greater than the setting value of F9.17 “PID sleep threshold”. If it is true, VFD will go to sleep mode and stop frequency output.

F9.18	Reserved

FE.03	PID parameters switching condition	Factory Setting	0
	Setting Options	0~2	
FE.04	PID parameter switching deviation 1	Factory Setting	20.0%
	Setting Options	0.0%~FE.05	
FE.05	PID parameter switching deviation 2	Factory Setting	80.0%
	Setting Options	FE.04~100.0%	

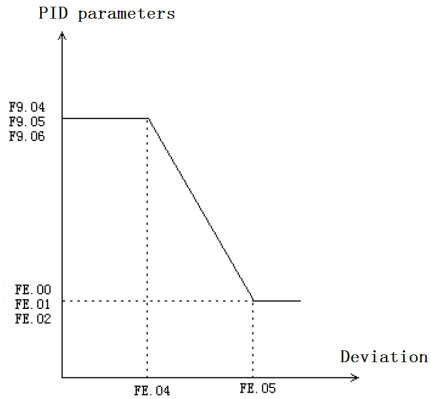
This series of VFD uses the first group of PID parameters (F9.04, F9.05, and F9.06) as factory default setting. In some applications, one group of PID parameters cannot fulfill the requirement of process control, and switching to the second group of PID parameters (FE.00, FE.01, and FE.02) is needed according to required conditions.

Switching over settings:

1. If FE.03 is set as 1, which means terminal switching, then the function code of designated terminal should be set as 39. If the designated terminal is on, PID control will switch to the second group of PID parameters, or it will switch back to the first group of PID parameters.

2. If FE.03 is set as 2,which means switching by feedback deviation, then the switching over is determined by the result of comparing the deviation between PID setting and PID feedback to the PID parameter switching deviation 1 & 2 (FE0.4 & FE0.5). If the feedback deviation is less than the PID parameter switching deviation 1(FE.04), the first group of PID parameters is chosen for process control;

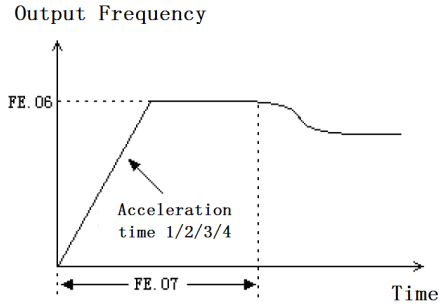
If the feedback deviation is great than the PID parameter switching deviation 2(FE.05), the second group of PID parameters is chosen; If the feedback deviation is between the PID parameter switching deviation 1 & 2 (FE.04 & FE.05), the PID parameters been used is through the linear calculation between the two groups of PID parameters, as shown in the following diagram.



PID Parameters Switching Over

FE.06	PID initial value	Factory Setting	0.0%
	Setting Options	0.0%~100.0%	
FE.07	PID initial value time	Factory Setting	0.00s
	Setting Options	0.00s~650.00s	

As PID process start, VFD will output frequency with PID initial value (FE.06) and hold until PID initial value time (FE.07) is over, then it begins to process PID control normally.



PID Initial Value Diagram

FE.08	PID integration options		Factory value	0
	Setting range	Unit's digit:	Integration separation	
		0	Disabled	
		1	Enabled	
		Ten's place:	Output limit and stop options	
		0	Continuing calculation	
		1	Stop calculation	

Integration Separation:

If this option is enabled, and while a terminal's function code is 25 and its input is on, PID control keeps calculating proportion item and differentiation item while stop integration calculation.

Output limit and stop options:

If the option is "stop calculation", while the PID output reaches the maximum or minimum limit, PID control stop calculation.

If the option is "continuing calculation", then PID will continue calculation at any situation.

FE.09	Max. increasing value permitted each PID output	Factory Setting	1.00%
	Setting Options	0.00%~100.00%	
FE.10	Max. decreasing value permitted each PID output	Factory Setting	1.00%
	Setting Options	0.00%~100.00%	

These two parameters are for the limiting of the deviation between two times of PID control output (2ms/time), and thus restrain the PID output from rapid increasing. FE.09 and FE.10 are corresponding to forward and reverse running output maximum deviation separately.

FE.11	PID reverse output frequency limit	Factory Setting	0.00Hz
	Setting Options	0.00Hz~F0.10	
FE.12	PID differentiation limit	Factory Setting	0.10%
	Setting Options	0.00%~100.0%	
FE.13	PID reverse output frequency limit	Factory Setting	0.00s
	Setting Options	0.00s~650.0s	
FE.14	PID differentiation limit	Factory Setting	0.00s
	Setting Options	0.00s~60.00s	
FE.15	PID reverse output frequency limit	Factory Setting	0.00s
	Setting Options	0.00s~60.00s	
FE.16	PID differentiation limit	Factory Setting	0
	Setting Options	0: Stop calculation 1: Continuing calculation	

5.11 FA Group Protection Parameters and Fault Records

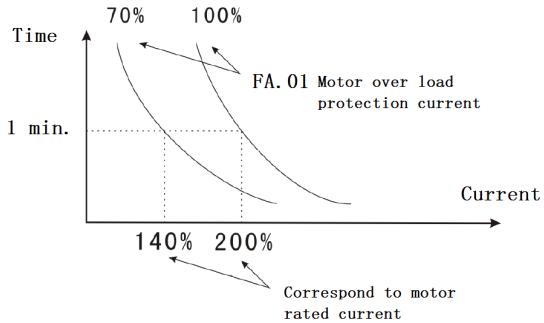
FA.00	Motor overload protection		Factory value	2
	Setting range	0	Protection disabled	
		1	Normal motor with low speed compensation	
		2	Variable frequency motor without low speed compensation	

0: Protection disabled. It means there is no protection with motor overload character in the VFD (Setting which must be carried out with extreme caution).

1: Ordinary motor (With low speed compensation). Because cooling efficiency of an ordinary motor becomes lower in the case of low speed, the corresponding electric thermal protection value should be adjusted suitably. The so-called with low speed compensation here, refers to reducing the threshold value of motor overload protection as the running frequency is below 30Hz.

2: Variable frequency motor (Without low speed compensation). Because the cooling efficiency of a variable frequency motor does not be influenced by its speed, it is no need to adjust the corresponding electric thermal protection value in low speed.

FA.01	Motor over load protection current	Factory Setting	100.0%
	Setting Options	20.0%~120.0% (motor rated current)	



Setting of Motor over load protection current

This parameter can be determined by the following formula:

Motor over load protection=(Allowed maximum load current/VFD rated current)*100%.

In the case of big VFD driving smaller motor, it is needed to set a correct value to this parameter for the protection of the motor.

FA.02	Threshold for frequency reducing at instantaneous power failure	Factory Setting	80.00%
	Setting Options	70.0%~110.0% (standard bus voltage)	
FA.03	Frequency reducing rate at instantaneous power failure	Factory Setting	0.00Hz
	Setting Options	0.00Hz~F0.10	

When frequency reducing rate at instantaneous power failure is set as 0, the function of frequency reducing at instantaneous power failure is disabled.

Threshold for frequency reducing at instantaneous power failure: it refers to the point of voltage which will be reached as the bus voltage dropping after an instantaneous power failure, at that point VFD start to decrease the output

frequency in the frequency reducing rate (FA.03) to let the motor working in generating state and keeping the bus voltage by the regenerating power, ensuring the operation of VFD until power on again.

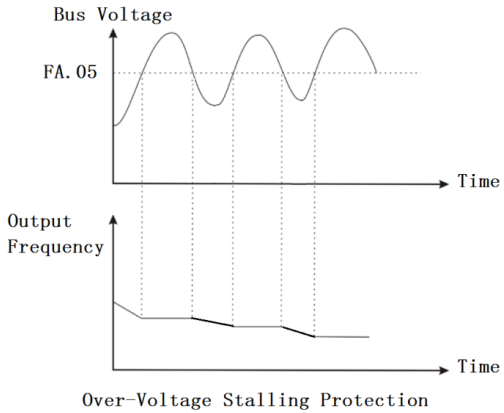
Note: Adjusting these two parameters to prevent down time of product line as VFD tripping caused by power grid switching.

FA.04	Over-voltage stalling protection	Factory Setting	0
	Setting Options	0	Disabled
		1	Enabled
FA.05	Over-voltage stalling protection point	Factory Setting	120%
	Setting Options	110~150%	

FA.04: As in deceleration process of VFD, by the influence of load inertia, the motor speed's deceleration rate might be lower than the frequency reducing rate, thus it results in power regeneration to VFD by motor and bus voltage increasing. In some cases with no measure being carried out, it will put the VFD to over voltage fault due to high bus voltage finally.

For 220V single phase VFD the value of parameter Over-voltage stalling protection point FA.05 is 120%, and for 380V three phase VFD this value of FA.05 is 130%.

The principle of over-voltage stalling protection is as following: By sensing bus voltage and comparing to FA.05 (relative to standard bus voltage) which defining the over-voltage stalling point, if the bus voltage is over the point, VFD will stop decreasing output frequency, and will keep running in current frequency until the bus voltage falling to lower than the point. And then VFD will continue to decelerate the motor again. As shown in the following illustration.

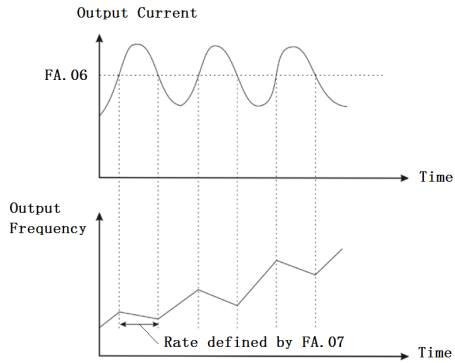


Over-Voltage Stalling Protection

FA.06	Auto current limiting level	Factory Setting	160%
	Setting Options	50~200%	
FA.07	Frequency decrease rate during current limiting	Factory Setting	10.00Hz
	Setting Options	0.00~50.00Hz/s	

During operation of VFD, the acceleration rate of motor speed may be lower than the increasing rate of output frequency due to heavy loads in some cases, and it will result in fault “over-current when acceleration” and VFD trigging with no measure being carried out.

The principle of auto current limiting is as following: By sensing VFD output current and comparing to FA.06 which defining the current limiting point, if the output current is over the point, VFD will decrease output frequency in the rate value of FA.07, and will return to normal operation until the output current falling to lower than the current limiting point. As shown in the following illustration.



Auto Current Limiting

FA.08	Auto current limiting selection	Factory Setting	0
	Setting Options	0	Enabled
		1	Disabled at constant speed

FA.09	Fault auto-reset times	Factory Setting	0
	Setting Options	0~3	

This parameter is for setting auto reset times of fault when VFD is chosen to automatically reset fault. If the times of resetting is over than this value, the VFD will stop and waiting for maintenance.

FA.10	Fault auto-reset interval	Factory Setting	1.0s
	Setting Options	0.1~100.0s	

This parameter defines the waiting time from VFD fault trigging to fault auto resetting.

FA.11	Reserved		
FA.12	Phase-lack protection of input	Factory Setting	1
	Setting Options	0	Disabled
		1	Enabled
FA.13	Phase-lack protection of output	Factory Setting	1
	Setting Options	0	Disabled
		1	Enabled

FA.12 is for choosing protection of input phase-lack fault or not. In these series of VFD, only those with rated power of 11kW or above have input phase-lack protection. To those with rated power below 11kW have no input phase-lack protection, no matter FA.12 is setting as 0 or 1.

FA.13 is for choosing protection of output phase-lack fault or not.

FA.14	Faults type last two time	0~26
FA.15	Fault Type last time	
FA.16	Current fault type	

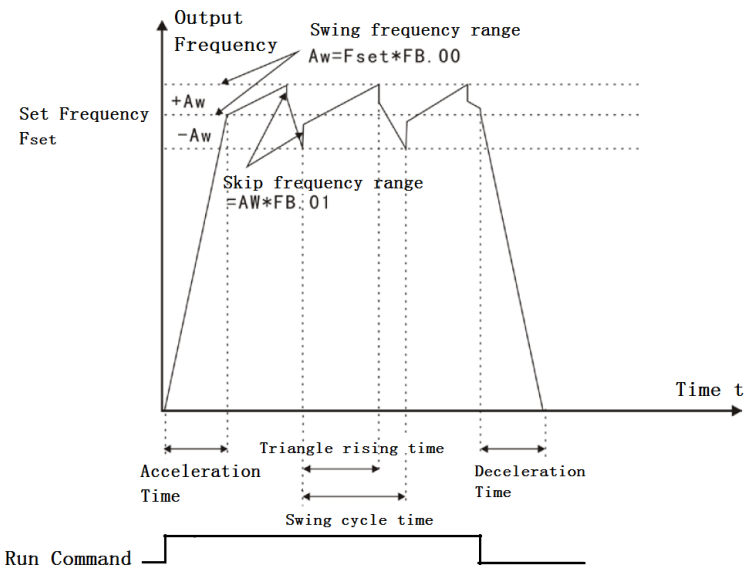
These parameters record the recent 3 fault types: 0 is no fault, 1~26 are E001~E026 (FULL). For the details please refer to Trouble Shooting.

FA.17	Running frequency at current fault	Record of running frequency when current fault occurs
FA.18	Output current at current fault	Record of output current when current fault occurs
FA.19	DC bus voltage at current fault	Record of DC bus voltage when current fault occurs
FA.20	Input terminal status when fault occurs	
FA.21	Output terminal status when fault occurs	

5.12 FB Group Swing Frequency and Counting Meter Parameters

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

The swing frequency function indicates that the output frequency of the VFD swings up and down with the setting frequency as the center. The trace of running frequency at the time axis is shown in the following figure. The swing amplitude is set by FB.00 and FB.01. When FB.01 is set as 0，namely the swing amplitude is 0，the swing frequency is disable.



Swing Frequency Function

FB.00	Swing frequency range	Factory Setting	0.00%
	Setting Options	0.0~100.0% (relative to setting frequency)	
FB.01	Skip frequency range	Factory Setting	0.00%

	Setting Options	0.0~50.0% (relative to swing frequency bandwidth)

These parameters are definitions of swing frequency range and skip frequency range.

The swing operation frequency is keep within bounds of upper and lower limits of frequency.

Swing amplitude(AW)=Set frequency(Fset)×Swing frequency range(FB.00)

Skip frequency range is the percentage of skip frequency to the swing frequency, as: Skip frequency=swing frequency×skip frequency range.

FB.02	Rising time of swing frequency	Factory Setting	5.0s
	Setting Options	0.1~3600.0s	
FB.03	Dropping time of swing frequency	Factory Setting	5.0s
	Setting Options	0.1~3600.0s	
FB.04	Fixed length control mode	Factory Setting	0
	Setting Options	0	Start from zero when power on
		1	Start from record of length of the last power off

0: VFD starts fixed length control from 0 every time it is power on.

1: VFD starts fixed length control from record of the last power off.

VFD can only starts fixed length control during operation mode, and never starts during stop mode

FB.05	Roller perimeter for fixed length control	Factory Setting	100cm
	Setting Options	0~9999cm	

Set roller perimeter which refers to 1 pulse of discrete signal per round to the multi-function digital input terminal of VFD.

Length counting displaying by VFD=Roller perimeter×accumulation of pulses.

FB.06	Fixed length setting	Factory Setting	1000m
	Setting Options	0~9999m	

Set the target fixed length, as the displaying length reached this setting or 9999m, it means the fixed length control is over and the VFD will display "FULL" and stop. To clear the accumulated length value and fault please press STOP key.

FB.07	Clear length value	Factory Setting	0
	Setting Options	0	No operation
		1	Clear

This parameter is for the operation of clearing current length value, and after clearing operation the parameter will be reset to 0 automatically.

FB.08	Counter value setting	Factory Setting	0
	Setting Options	FB.09~9999	
FB.09	Designated counter value	Factory Setting	0
	Setting Options	0~FB.08	
FB.10	Length unit selection	Factory Setting	0
	Setting Options	0	Actual counting length = displayed length* 1m
		1	Actual counting length= displayed length* 10m

5.13 FC Group RS485 Communication Parameters

FC.00	Local address	Factory Setting	1
	Setting Options	0~247	

When the master node's communication frame address is 0, it refers to the broadcast address, and all the slave nodes will receive this frame but never reply. Note: The address of slave node cannot be set as 0.

A local node address must be unique among the whole communication network. This is essential for the peer-to-peer communication between a upper monitor and VFDs.

FC.01	Baud rate selection	Factory Setting	3
	Setting Options	0	1200BPS
		1	2400BPS
		2	4800BPS
		3	9600BPS
		4	19200BPS
		5	38400BPS

This parameter is used for setting of data transfer speed between upper monitor and VFDs. Note: The baud rate settings of upper monitor and VFDs must be identical, or communication cannot be carried out. The larger the baud rate is, the faster the communication speed.

FC.02	Data bit check and format	Factory Setting	0
	Setting Options	0: No check (N, 8, 1) for RTU 1: Even parity check (E, 8, 1) for RTU 2: Odd parity check (0, 8, 1) for RTU 3: No check (N, 8, 2) for RTU 4: Even parity check (E, 8, 2) for RTU	

		5: Odd parity check (0, 8, 2) for RTU	
FC.03	Communication response delay time	Factory Setting	0
	Setting Options	0~200ms	

Response delay time: It refers to the time span between the time VFD finishes receiving data and the time VFD sends response data. If the response delay time setting is shorter the system processing time, the delay is determined by the system processing time. If the response delay time setting is longer than the system processing time, then after the system processing is finished, it will wait to send data to upper monitor until timing of the response delay time is over.

FC.04	Communication timeout fault setting	Factory Setting	0.0s
	Setting Options	0.0 (disabled), 0.1~100.0s	

When this parameter is set as 0.0, it is disabled.

When this parameter is set as a valid none-zero value, if time span between the current communicating and last communicating exceeds the setting time of FC.04, system will handle the fault according to the setting of FC.05.

Normally, it is set as disabled. It is often set for monitoring communication in case of application where continued communication is required.

FC.05	Method of disposing communication timeout fault	Factory Setting	1
	Setting Options	0	Alarm and coast to stop
		1	No alarm and continue to run
		2	No alarm but stop according to F1.05 (only when F0.01= 2)
		3	No alarm but stop according to F1.05

This parameter is the selection for handling the fault of communication timeout between upper monitor and VFD.

0: Alarm and coast to stop. If time span between the current communicating and last communicating exceeds the setting time of FC.04, VFD will trig an error E016 and coast to stop.

1: No alarm and continue to run. If time span between the current communicating and last communicating exceeds the setting time of FC.04, VFD will continue operating.

2: No alarm but stop according to F1.05 (only when F0.01= 2). Under setting of communication control source, if time span between the current communicating and last communicating exceeds the setting time of FC.04, VFD will decelerate to stop.

3: No alarm but stop according to F1.05 (Under all kinds of control command). No matter what VFD is under any of the keypad control, terminal control or communication control source settings, as time span between the current communicating and last communicating exceeds the setting time of FC.04, VFD will decelerate to stop.

VFD can be set to one of the following methods: shielding the error E016, stopping or continuing operation, when there are communication malfunctions.

FC.06	Transmission response action	Factory Setting	00
	Setting Options	Unit's digit: 0: Response to writing 1: No response to writing Ten's place: 0:Value not saved when power-off 1: Value saved when power-off	

This parameter is for selection of response or not to the host's message when communication is carried out between upper monitor and VFD.

5.14 FD Group Multi-step Speed and Simple PLC Parameters

Simple PLC function is a programmable logic controller (PLC) in the AC drive, which can automatically control the logic of multi-step frequency. In order to meet the technical requirements, it can conduct running time, running direction and running frequency. VFD can realize 16-stage speed variation control and there are four kinds of acceleration and deceleration time for selection. When PLC completes one cycle, ON signal can be output by multi-function digital output terminal MO1 or multi-function relay 1, relay 2 output. For details, see F1.02 ~ F1.05. When the frequency reference selection is multi-speed operation mode (Parameters F0.07, F0.03 and F0.04), it is needed to set FD.00 for required characteristic.

FD.00	Simple PLC operation method	0:Stop after operation once time 1:Keep the final value after operation once time 2:Operation in cycles		0	○
FD.01	Memory option of simple PLC when power-off	0: Invalid 1:Valid		0	○
FD.02	Multi-step speed 0	-100~100%	0.10%	0.00%	○
FD.03	0th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.04	Multi-step speed 1	-100~100%	0.10%	0.00%	○
FD.05	1st step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.06	Multi-step speed 2	-100~100%	0.10%	0.00%	○
FD.07	2nd step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.08	Multi-step speed 3	-100~100%	0.10%	0.00%	○

FD.09	3rd step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.10	Multi-step speed 4	-100~100%	0.10%	0.00%	○
FD.11	4th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.12	Multi-step speed 5	-100~100%	0.10%	0.00%	○
FD.13	5th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.14	Multi-step speed 6	-100~100%	0.10%	0.00%	○
FD.15	6th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.16	Multi-step speed 7	-100~100%	0.10%	0.00%	○
FD.17	7th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.18	Multi-step speed 8	-100~100%	0.10%	0.00%	○
FD.19	8th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.20	Multi-step speed 9	-100~100%	0.10%	0.00%	○
FD.21	9th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.22	Multi-step speed 10	-100~100%	0.10%	0.00%	○
FD.23	10th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.24	Multi-step speed 11	-100~100%	0.10%	0.00%	○
FD.25	11th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○

FD.26	Multi-step speed 12	-100~100%	0.10%	0.00%	○
FD.27	12th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.28	Multi-step speed 13	-100~100%	0.10%	0.00%	○
FD.29	13th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.30	Multi-step speed 14	-100~100%	0.10%	0.00%	○
FD.31	14th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.32	Multi-step speed 15	-100~100%	0.10%	0.00%	○
FD.33	15th step running time	0.0~6553s(m)	0.1s(m)	0.0s	○
FD.34	Acceleration time of 0th~7th steps	0~0xFFFF		0	○
FD.35	Acceleration time of 8th~15th steps	0~0xFFFF		0	○
FD.36	PLC restart method	0: Restart from 1st step 1: Restart from break-off frequency	0	0	○
FD.37	PLC operation time unit	0: second (s) 1: minute (m)		0	○

FF Group: Reserved Factory Parameters

Chapter 6 Trouble Shooting

6.1 Fault and Trouble Shooting

Fault Code	Fault Type	Reason	Solution
E001	Inverter module fault	1: Acceleration time is too short 2: IGBT module damaged 3: Malfunction caused by interference 4: Grounding is not properly	1: Increase acceleration time 2: Ask for support 3: Inspect external equipment and eliminate interference 4: Check grounding wire
E002	Over-current during acceleration	1: Accelerate too fast 2: Input voltage is too low 3: Drive capacity is too low	1: Increase acceleration time 2: Inspect the input power supply or wiring 3: Select larger capacity drive
E003	Over-current during deceleration	1: Decelerate too fast 2: Load is too heavy and has large inertia 3: Drive capacity is too low	1: Increase deceleration time 2: Add suitable braking units 3: Select larger capacity drive
E004	Over-current at constant speed	1: Sudden change of load 2: Input voltage is too low 3: Drive capacity is too low	1: Check the load 2: Inspect the input power supply or wiring 3: Select larger capacity drive
E005	Over-voltage during acceleration	1: Input voltage abnormal 2: Restart the motor when instantaneous trip-off occurs	1: Inspect input power 2: Avoid prompt restart when trip-off
E006	Over-voltage during deceleration	1: Decelerate too fast 2: Load is too heavy and has large inertia 3: Input voltage abnormal	1: Increase deceleration time 2: Add suitable braking units
E007	Over-voltage at constant speed	1: Input voltage abnormal 2: Load inertia is too large	1: Install input AC reactor 2: Add suitable braking units
E008	Hardware over-voltage	1: Input voltage abnormal 2: Decelerate too fast	1: Inspect the input power supply or wiring

Fault Code	Fault Type	Reason	Solution
		3: Load inertia is too large	2:Increase deceleration time 3: Add suitable braking units
E009	Under voltage of DC bus	Input voltage is too low	Inspect power grid
E010	Drive overload	1: Accelerate too fast 2: Restart the motor when instantaneous trip-off occurs 3: Input voltage is too low 4: Load is too heavy	1:Increase acceleration time 2: Avoid prompt restart when trip-off 3: Inspect power grid 4: Select larger capacity drive
E011	Motor overload	1: Input voltage is too low 2: Improper setting of motor rated current 3: Improper motor's overload protection threshold 4: Drive capacity is too low	1: Inspect voltage of power grid 2: Properly setting of motor rated current 3: Inspect load and boost the torque 4: Select larger capacity drive
E012	Phase-lack of input	Phase-lack of R, S, T	Inspect the input power supply or wiring
E013	Phase-lack of output	1: There is a broken wire in the output cable 2: There is a broken wire in the motor winding. 3.: Output terminals are loose	Check the wiring and installation
E014	Module overheat	1:Instantaneous over current of inverter 2:Output short circuit 3: Cooling fans of inverter stop or damaged. Obstruction of ventilation channel 4: Ambient temperature is too high 5: The cables or terminals are loose 6: Power circuit abnormal 7: Control PCB board abnormal	1: Refer to over current solutions 2: Use the good wire 3: Replace cooling fan and clear the ventilation channel 4:Decrease the ambient temperature 5:Inspect and tighten the wire and terminals 6 and 7: Ask for support

Fault Code	Fault Type	Reason	Solution
E015	External fault	External fault input terminals take effect	Inspect external equipment
E016	Communication fault	1: Improper baud rate setting 2: Receive wrong data 3: Communication is interrupted for long time	1: Set proper baud rate 2: Push STOP/RESET to reset and ask for support 3: Check communication devices and cables
E017	Reserved		
E018	Current detection fault	1: Wires or connectors of control board are loose 2: Amplifying circuit abnormal 3: Hall sensor is damaged 4: Power circuit abnormal	1:Check the wiring and connectors 2,3 and 4: Ask for support
E019	Motor auto-tuning fault	1: Improper setting of motor rated parameters 2: Overtime of autotuning 3: Too much error	1: Set rated parameters according to motor nameplate 2: Check motor's wiring 3: Make motor uncoupled with load and autotune again
E020	Reserved		
E021	Reserved		
E022	EEPROM fault	1: Read/ Write fault of control parameters 2: EEPROM damaged	Push STOP/RESET to reset and ask for support
E023	Overload pre-alarm	1: Accelerate too fast 2: Restart the motor when instantaneous trip-off occurs 3: Input voltage is too low 4: Load is too heavy	1:Increase acceleration time 2: Avoid prompt restart when trip-off 3: Inspect power grid 4: Select larger capacity inverter 5: Set the suitable parameter of F3.10
E024	PID feedback loss fault	1: Sensor disconnect or loose contact 2: Detecting time of disconnection is too short	1: Check sensor installation and connection 2: Extend the detecting time of sensor disconnection

Fault Code	Fault Type	Reason	Solution
		3: No feedback signal of system	
E025	Running time reached	Accumulative running time reached	Reset. Refer to parameter F8.17 for details.
FULL	Counting meter full	1: Setting value of counting meter reached 2: The value of counting meter gets to 9999m	Push STOP/RESET key to reset

6.2 Common Faults and Solutions

Inverter may have following faults or malfunctions during operation, please refer to the following solutions.

6.2.1 No display after power on

• Inspect whether the voltage of power supply is the same as the inverter rated voltage or not with multi-meter. If the power supply has problem, inspect and solve it.

• Inspect whether the three-phase rectify bridge is in good condition or not. If the rectification bridge is burst out, ask for support.

6.2.2 Power supply air switch trips off when power on

• Inspect whether the input power supply is grounded or short circuit. Solve this problem.

• Inspect whether the rectify bridge has been burnt or not. If it is damaged, ask for support.

6.2.3 Motor doesn't run after inverter works

• Inspect if there is balanced three-phase output among U, V, W. If yes, then motor could be damaged, or mechanically locked.

• If the output is unbalanced or lost, the inverter drive board or the output module may be damaged, ask for support..

6.2.4 Inverter displays normally when power on, but switch at the input side trips when running

• Inspect whether the output side of inverter is short circuit. If yes, ask for support.

• Inspect whether ground fault exists. If yes, solve it.

• If trip happens occasionally and the distance between motor and inverter is too far, it is recommended to install output AC reactor.

• Inspect whether the output module is burnt or not. If yes, ask for support.

Chapter 7 EMC

7.1 Definition

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.

7.2 Introduction to EMC Standard

According to requirements of China National Standard GB/T12668.3(Equates IEC/EN 61800-3:2004), variable frequency AC drives must meet two aspects of requirements: one is electromagnetic interference generation level, and the other is capability of electromagnetic interference resistance.

8000B series VFD satisfies the requirements of standard IEC/EN 61800-3: 2004(Adjustable speed electrical power drive systems part 3:EMC requirements and specific test methods), which equates China National Standard GB/T12668.3.

7.3 EMC Guideline

7.3.1 Harmonic Influence

Higher harmonics of power input may damage the VFD. Thus, in case of applications where power quality is rather poor, it is recommended to install an AC input reactor.

7.3.2 Installation Notices for Electromagnetic Interference

There are two kinds of electromagnetic interference, one is the electromagnetic noise from environment around which interferes the VFD, and the other is emission and harmonic generated by the VFD which interferes other devices.

Installation Notices:

1. Correctly ground VFD and other electric devices.

2. Keep the lines of power input and output of VFD away from signal and control lines, and do not run these two kinds of cables in parallel but in vertical as far as possible.

3. Shield cable is recommended for output power lines of VFD, or the cable can be shielded by steel pipe, and the shields must be grounded correctly; It is recommended to use twisted shield control cable for devices being interfered, and the shields must be grounded correctly.

4. In case of application with long motor cable which is over 100m, an output filter or AC output reactor is needed.

7.3.3 Methods for Handling Surrounding Interference to VFD

Normally electromagnetic interferences to the VFD are generated from large number of devices installed nearby including relays, contactor, or magnetic brakes. If a VFD is in malfunction by interference, it is recommended to use the following methods:

1. Install surge arrestor to the part which generates interference.

2. Install filter to the input of VFD, as details in 8.3.6.

3. It is recommended to use shield cable for control and sensing signals, and cable shields must be grounded correctly.

7.3.4 Methods for Handling VFD Interference to Surrounding Devices

The electromagnetic noises can be classified as two kinds, one is emission, and the other is conduction interference. These two kinds of interferences can make the surrounding devices suffering electromagnetic or electrostatic induction, some will be malfunction due to interference. The following are methods for different cases:

1. Signals of instruments, receiver and sensors for measuring are fairly weak to be interfered easily if they are close to the VFD or in the same control cabinet. It is recommended to solve the problem: Keep away from VFD as far as possible; Do not arrange signal cables running close and parallel to power cables, especially never bundle them up; It is recommended to use shield cable for signal and power transfer, and must be grounded correctly; To the output of VFD, add ferrite beads and make 2~3 coils each (Select the models for suppressing scope of 30~1000MHz); To some worse cases, install an EMC output filter.

2. If the device which is interfered shares the same power source with VFD and results in conducting interference, and the methods above cannot eliminate the interference, an EMC filter should be installed to the power input of VFD (For details refers to 8.3.6).

3. Grounding peripheral devices separately can avoid the interference caused by VFD ground leakage current through common ground.

7.3.5 Leakage Current Handling

There are two types of leakage current in VFD application: one is ground leakage current, and the other is line-to-line leakage current.

1. Factors of ground leakage current

There is distributed capacitance between line conductor and earth ground. The larger the distributed capacitance, the larger ground leakage current is. For reducing the distributed capacitance, it is effective shortening the distance from VFD to motor. The higher the Carrier frequency is, the larger the ground leakage current is. It is effective to reduce ground leakage current by lowering the carrier frequency, but will result in increasing of motor noise. Note: Installing an electric reactor is also an effective method for lowering ground leakage current.

Ground leakage current will increase as the main circuit current increasing, i.e. the larger power the motor, the larger ground leakage current is.

2. Factors of line-to-line leakage current

There is distributed capacitance between line conductors of VFD output cable. If the current through the output cable include high order harmonic current, it may cause syntony which resulting in line-to-line leakage current. In this situation, if a thermal overload relay is employed, it might be caused malfunction.

To prevent malfunction, lower the carrier frequency or install an output reactor. When a VFD has been used, it is recommended to use motor overload protection of VFD instead of employing a thermal overload relay to the motor.

7.3.6 Notice for Installation of EMC Input Filter

1. Usage of an EMC filter must be in strict accordance with its rated specifications. As a filter belongs to Category I apparatus, its metal ground enclosure must be contacted to the ground bus of control cabinet as far as possible in surface, and the continuity of ground conductor must be good, or it will lead to risk of electric shock and also badly affect the effect of EMC.

2. The ground enclosure of EMC filter must be connected to the same common ground bus, or it will badly affect the effect of EMC.

3. The filter must be installed as close as possible to the power input terminals of VFD.

Chapter 8 Communication Protocol

8.1 Communication Interface

RS485: asynchronous, half-duplex.

Default: 8-N-1, 9600bps. See FC Group: RS485 Communication Parameters.

8.2 Communication Modes

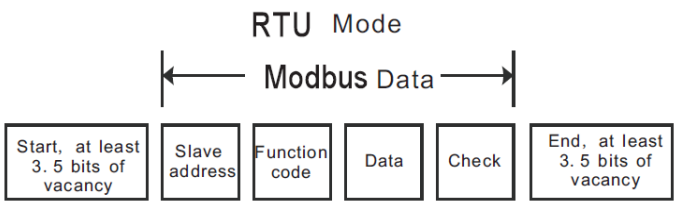
The protocol is modbus protocol. Besides the common register Read/Write operation, it is supplemented with commands of parameters management.

The VFD(AC drive) is a slave in the network. It communicates in point to point master-slave mode. It will not respond to the command sent by the master via broadcast address.

In the case of multi-drive communication or long-distance transmission, connecting a 100~120Ω resistor in parallel with the master signal line will help to enhance the immunity to interference.

8.3 Frame Format

8000B series modbus protocol supports only RTU mode. The frame format is illustrated as follows:



Modbus adopts "Big Endian" representation for data frame. This means that when a numerical quantity larger than a byte is transmitted, the most significant byte is sent first.

RTU mode

In RTU mode, the modbus minimum idle time between frames should be no less than 3.5 bytes. The checksum adopts CRC-16 method. All data except checksum itself sent will be counted into the calculation. Please refer to section: CRC Check for more information. Note that at least 3.5 bytes of modbus idle time should be kept and the start and end idle time need not be summed up to it.

The table below shows the data frame of reading parameter 0002H (F0.02) from slave node address 1.

Node addr.	Command	Data addr.		Data No.		CRC	
01H	03H	00H	02H	00H	01H	25H	CAH

The table below shows the reply frame from slave node address 1.

Node addr.	Command	Byte No.	Data		CRC	
01H	03H	02H	00H	00H	B8H	44H

8.4 Protocol Function

Different respond delay can be set through drive's parameters to adapt to different needs.

For RTU mode, the respond delay should be no less than 3.5 bytes interval.

The main function of modbus is to read and write parameters. The modbus protocol supports the following commands:

03H	Read VFD's function parameter(s) and status data
06H	Write single function parameter or control command or communication settings to VFD

All drive's function parameters, control command and status data are mapped to modbus R/W data address.

For the data address of VFD’s control command, communication settings and

status data, please refer to the following table.

Parameter Description	Address	Meaning of value	R/W Feature
Control Command	1000H	0001H: Forward	W/R
		0002H: Reverse	
		0003H: JOG forward	
		0004H: JOG reverse	
		0005H: Stop	
		0006H: Coast to stop	
		0007H: Reset fault	
		0008H: JOG stop	
VFD status data	1001H	0001H: Forward running	R
		0002H: Reverse running	
		0003H: Standby	
		0004H: Fault	
		0005H: LU Status of inverter	
Communication setting	2000H	Communication Setting Range (-10000~10000) Note: the communication setting is the percentage of the relative value (-100.00%~100.00%). If it is set as frequency source, the value is the percentage of the maximum frequency. If it is set as PID (preset value or feedback value), the value is the percentage of the PID.	W/R
	2001H	PID setting， Range: 0~1000，1000 means100.0%	W/R

	2002H	PID fedback， Range: 0~1000，1000 means100.0%	W/R
	2003H	Setting value of torque Range: -1000~1000 1000 means 100.0%	W/R
	2004H	Setting value of upper limit frequency (0~Fmax)	W/R
VFD Status data	3000H	Output frequency	R
	3001H	Reference frequency	R
	3002H	DC Bus voltage	R
	3003H	Output voltage	R
	3004H	Output current	R
	3005H	Rotation speed	R
	3006H	Output power	R
	3007H	Output torque	R
	3008H	PID preset value	R
	3009H	PID feedback value	R
	300AH	Input terminal status	R
	300BH	Output terminal status	R
	300CH	Input of AVI	R
	300DH	Input of ACI	R
	300EH	Reserved	R
	300FH	Reserved	R
	3010H	Reserved	R

	3011H	Reserved	R
	3012H	Step No. of PLC or multi-step	R
	3013H	Reserved	R
	3014H	External counter input	R
	3015H	Reserved	R
	3016H	Reserved	R
VFD fault info address	5000H	Fault Code in Hex format	R

The above shows the format of the frame. Now we will introduce the modbus command and data structure in details, which is called protocol data unit for simplicity. Also MSB stands for the most significant byte and LSB stands for the least significant byte for the same reason. The description below is data format in RTU mode.

Protocol data unit format of reading parameters:

Request format:

Protocol data unit	Data length(bytes)	Range
Command	1	03H
Data Address	2	0~FFFFH
Data Number	2	0001~0010H

Note: The maximum number of data can be read in one request is 16 (0010H).

Reply format (success):

Protocol data unit	Data length(bytes)	Range
Command	1	03H
Returned byte number	2	2*Read number
Data content	2	

If the operation fails, the VFD will reply a message formed by failure command and error code. The failure command is (Command＋0x80). The error code indicates the reason of the error; see the table below.

Code	Error	Error content
01H	Illegal Command	The command from master cannot be executed. The reason maybe: 1. This command is only for new version and this version cannot realize. 2. Slave is in fault and cannot execute it.
02H	Illegal data address	Some of the operation addresses are invalid or not allowed to access.
03H	Illegal value	When there are invalid data in the message framed received by slave. Note: This error code does not indicate the data value to write exceed the range, but indicate the message frame is an illegal frame.
06H	Slave busy	VFD is Busy (EEPROM is storing).
10H	Password error	The password written to the password check address is not the same as the password set by F7.00.
11H	Checksum error	The CRC (RTU mode) check not passed.
12H	Written no allowed	It only happen in write command, the reason maybe: 1. The data to write exceed the range of according parameter. 2. The parameter should not be modified now. 3. The terminal has already been used.
13H	System locked	When password protection take effect and user does not unlock it, write/read the function parameter will return this error.

Protocol data unit format of writing single parameter:

Request format:

Protocol data unit	Data length(bytes)	Range
Command	1	06H
Data Address	2	0~FFFFH
Written Content	2	0~FFFFH

Reply format (success):

Protocol data unit	Data length(bytes)	Range
Command	1	06H
Data Address	2	0~FFFFH
Written Content	2	0~FFFFH

If the operation fails, the inverter will reply a message formed by failure command and error code. The failure command is (Command＋0x80). The error code indicates the reason of the error.

8.5 Note

1. Between frames, the span should not less than 3.5 bytes interval; otherwise, the message will be discarded.

2. Be cautious to modify the parameters of FC group through communication, otherwise may cause the communication interrupted.

3. In the same frame, if the span between two near bytes is more than 1.5 bytes interval, the behind bytes will be assumed as the start of next message so that communication will fail.

8.6 CRC Checksum

For higher speed, CRC-16 uses tables. The following are C language source code for CRC-16.

```
unsigned int crc_cal_value(unsigned char *data_value,unsigned char data_length)
{
int i;
unsigned int crc_value=0xffff;
while(data_length--)
{
crc_value^=*data_value++;
                for(i=0;i<8;i++)
                {
if(crc_value&0x0001)crc_value=(crc_value>>1)^0xa001;
          else crc_value=crc_value>>1;
          }
        }
return(crc_value);
}
```

8.7 Example

RTU mode, read 2 data from 0008H (Parameters F0.08~F0.09)

The request command is:

START	T1-T2-T3-T4
NODE ADDRESS	01H
COMMAND	03H
DATA ADDRESS HIGH BYTE	00H
DATA ADDRESS LOW BYTE	08H
DATA NUMBER HIGH BYTE	00H
DATA NUMBER LOW BYTE	02H
CRC LOW BYTE	45
CRC HIGH BYTE	C9
END	T1-T2-T3-T4

The reply is:

START	T1-T2-T3-T4
NODE ADDRESS	01H
COMMAND	03H
BYTE NUMBER	04H
DATA 0008H HIGH BYTE	13H
DATA 0008H LOW BYTE	88H
DATA 0009H HIGH BYTE	00H
DATA 0009H LOW BYTE	00H
CRC LOW BYTE	7E
CRC HIGH BYTE	9D
END	T1-T2-T3-T4

In this example, the VFD's data settings of 0008H~0009H (F0.08~F0.09) is read by upper monitor: Data 0008H =1388H, which can be transfer to decimal number 5000 that means parameter F0.08 is set as 50.00Hz; While data 0009H =0000H

which means that F0.09 is set as 0 as running direction is forward.

Note: The above reply is an example, and the exact data may be different according to each separate application.

8.8 Data Address Table of Function Code

F0. 00	0	F1. 07	33	F3. 05	66
F0. 01	1	F1. 08	34	F3. 06	67
F0. 02	2	F1. 09	35	F3. 07	68
F0. 03	3	F1. 10	36	F3. 08	69
F0. 04	4	F1. 11	37	F3. 09	70
F0. 05	5	F1. 12	38	F3. 10	71
F0. 06	6	F1. 13	39	F3. 11	72
F0. 07	7	F1. 14	40	F3. 12	73
F0. 08	8	F1. 15	41	F4. 00	74
F0. 09	9	F1. 16	42	F4. 01	75
F0. 10	10	F1. 17	43	F4. 02	76
F0. 11	11	F1. 18	44	F4. 03	77
F0. 12	12	F1. 19	45	F4. 04	78
F0. 13	13	F1. 20	46	F4. 05	79
F0. 14	14	F1. 21	47	F4. 06	80
F0. 15	15	F2. 00	48	F4. 07	81
F0. 16	16	F2. 01	49	F4. 08	82
F0. 17	17	F2. 02	50	F4. 09	83
F0. 18	18	F2. 03	51	F4. 10	84
F0. 19	19	F2. 04	52	F4. 11	85
F0. 20	20	F2. 05	53	F4. 12	86
F0. 21	21	F2. 06	54	F4. 13	87
F0. 22	22	F2. 07	55	F4. 14	88
F0. 23	23	F2. 08	56	F4. 15	89
F0. 24	24	F2. 09	57	F4. 16	90
F0. 25	25	F2. 10	58	F4. 17	91
F1. 00	26	F2. 11	59	F5. 00	92
F1. 01	27	F2. 12	60	F5. 01	93
F1. 02	28	F3. 00	61	F5. 02	94
F1. 03	29	F3. 01	62	F5. 03	95
F1. 04	30	F3. 02	63	F5. 04	96
F1. 05	31	F3. 03	64	F5. 05	97
F1. 06	32	F3. 04	68	F5. 06	98

F5. 07	99
F5. 08	100
F5. 09	101
F5. 10	102
F5. 11	103
F5. 12	104
F5. 13	105
F5. 14	106
F5. 15	107
F5. 16	108
F5. 17	109
F5. 18	110
F5. 19	111
F5. 20	112
F5. 21	113
F5. 22	114
F5. 23	115
F5. 24	116
F5. 25	117
F5. 26	118
F5. 27	119
F5. 28	120
F5. 29	121
F5. 30	122
F5. 31	123
F5. 32	124
F6. 00	125
F6. 01	126
F6. 02	127
F6. 03	128
F6. 04	129
F6. 05	130
F6. 06	131
F6. 07	132
F6. 08	133
F6. 09	134

F6. 10	135
F6. 11	136
F6. 12	137
F6. 13	138
F6. 14	139
F6. 15	140
F6. 16	141
F6. 17	142
F6. 18	143
F7. 00	144
F7. 01	145
F7. 02	146
F7. 03	147
F7. 04	148
F7. 05	149
F7. 06	150
F7. 07	151
F7. 08	152
F7. 09	153
F7. 10	154
F7. 11	155
F7. 12	156
F7. 13	157
F8. 00	158
F8. 01	159
F8. 02	160
F8. 03	161
F8. 04	162
F8. 05	163
F8. 06	164
F8. 07	165
F8. 08	166
F8. 09	167
F8. 10	168
F8. 11	169
F8. 12	170

F8. 13	171
F8. 14	172
F8. 15	173
F8. 16	174
F8. 17	175
F8. 18	176
F8. 19	177
F8. 20	178
F8. 21	179
F8. 22	180
F8. 23	181
F8. 24	182
F8. 25	183
F8. 26	184
F8. 27	185
F8. 28	186
F8. 29	187
F9. 00	188
F9. 01	189
F9. 02	190
F9. 03	191
F9. 04	192
F9. 05	193
F9. 06	194
F9. 07	195
F9. 08	196
F9. 09	197
F9. 10	198
F9. 11	199
F9. 12	200
F9. 13	201
F9. 14	202
F9. 15	203
F9. 16	204
F9. 17	205
F9. 18	206

FA. 00	207
FA. 01	208
FA. 02	209
FA. 03	210
FA. 04	211
FA. 05	212
FA. 06	213
FA. 07	214
FA. 08	215
FA. 09	216
FA. 10	217
FA. 11	218
FA. 12	219
FA. 13	220
FA. 14	221
FA. 15	222
FA. 16	223
FA. 17	224
FA. 18	225
FA. 19	226
FA. 20	227
FA. 21	228
FB. 00	229
FB. 01	230
FB. 02	231
FB. 03	232
FB. 04	233
FB. 05	234
FB. 06	235
FB. 07	236
FB. 08	237
FB. 09	238
FB. 10	239
FC. 00	240
FC. 01	241
FC. 02	242

FC. 03	243
FC. 04	244
FC. 05	245
FC. 06	246
FD. 00	247
FD. 01	248
FD. 02	249
FD. 03	250
FD. 04	251
FD. 05	252
FD. 06	253
FD. 07	254
FD. 08	255
FD. 09	256
FD. 10	257
FD. 11	258
FD. 12	259
FD. 13	260
FD. 14	261
FD. 15	262
FD. 16	263
FD. 17	264
FD. 18	265
FD. 19	266
FD. 20	267
FD. 21	268
FD. 22	269
FD. 23	270
FD. 24	271
FD. 25	272
FD. 26	273
FD. 27	274
FD. 28	275
FD. 29	276
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FD. 31	278

FD. 32	279
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