Preface

Thank you for purchasing KD (KD100, KD200 and KD300) series inverters.

This manual describes how to use KD series inverter properly. Please read it carefully before installation, operation, maintenance and inspection. Besides, please use the product after understanding the safety precautions.

Precautions
● In order to describe the product's details, the drawings presented in this instruction are sometimes shown without covers or protective guards. When using the product, please make sure to install the cover or protective guard as specified firstly, and operate the products in accordance with the instructions. ● Since the drawings in this manual are represented examples, some are subject to differ from delivered products. ● This manual may be modified when necessary because of improvement of the product, modification or changes in specifications. Such modifications are denoted by a revised manual No. ● If you want to order the manual due to loss or damage, please contact our company agents in each region or our company customer service center directly. ● If there is still any problem during using the products, please contact our company customer service center directly.

Contents

Chapter 1 Safety and Precautions

Safety definition:

In this manual, safety precautions are classified as follows:

 Danger: Operations which are not performed according to requirements may cause serious equipment loss or personnel injury.

 Caution: Operations which are not performed according to requirements may cause medium hurt or light hurt or material loss.

During the installation, commissioning and maintenance of the system, please make sure to follow the safety and precautions of this chapter. In case of a result of illegal operations, caused any harm and losses is nothing to do with the company.

1.1 Safety Precautions

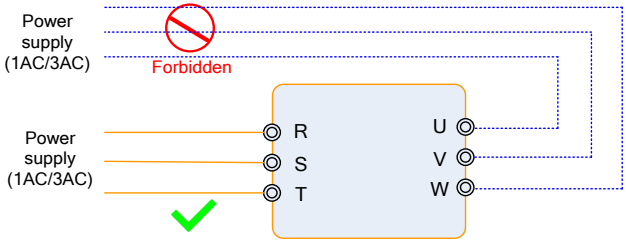
1.1.1 Before Installation:

 Danger	● Do not use the water-logged inverter, damaged inverter or inverter with missing parts. Otherwise, there may be risk of injury. ● Use the motor with Class B or above insulation. Otherwise, there may be risk of electric shock.
 Caution	● Carefully handled when loading, otherwise it may damage the inverter. ● Please don't use the damaged driver or inverter with missing parts, there may be risk of injury. ● Do not touch the electronic parts and components; otherwise it will cause static electricity.

1.1.2 During Installation:

 Danger	● Install the inverter on incombustible surface such as metal, and keep away from flammable substances. Otherwise it may cause fire. ● Do not loose the set screw of the equipment, especially the screws marked in RED.
 Caution	● Do not drop the cable residual or screw in the inverter. Otherwise it may damage the inverter. ● Please install the driver in the place where there is no direct sunlight or less vibratory. ● When more than two inverters are to be installed in one cabinet, due attention should be paid to the installation locations (refer to Chapter 3 Mechanical and Electrical Installation) to ensure the heat sinking effect.

1.1.3 During Wiring:

Danger	● Operation should be performed by the professional engineering technician. Otherwise there will be danger of electric shock! ● There should be circuit breaker between the inverter and power supply. Otherwise, there may cause fire! ● Make sure the power is disconnected prior to the connection. Otherwise there will be danger of electric shock! ● The ground terminal should be earthed reliably. Otherwise there may be danger of electric shock.
Caution	● Never connect AC power to output U, V, W terminals. Please note the remark of the wiring terminals, connect them correctly. Otherwise it will cause inverter be damaged.  ● Ensure the wiring circuit can meet the requirement of EMC and the area safety standard. Please follow the instructions in the manual before wiring. Otherwise may cause injury or electric shock. ● Never connect the braking resistor between DC bus (+), (-) terminals. Otherwise may cause fire. ● Encoder must be used together with shielded wire, and ensure the single terminal of the shielded lay is connected with ground well.

1.1.4 Before Power-on:

Danger	● Please confirm whether the power voltage class is consistent with the rated voltage of the inverter and whether the I/O cable connecting positions are correct, and check whether the external circuit is short circuited and whether the connecting line is firm. Otherwise it may damage the inverter. The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused. ● The inverter is free from dielectric test because this test is performed prior to the delivery. Otherwise accident may occur.
Caution	● The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused! ● Whether all the external fittings are connected correctly in accordance with the circuit provided in this manual. Otherwise accident may occur!

1.1.5 After Power-on:

 Danger	● Do not open the cover of the inverter upon power-on. Otherwise there will be danger of electric shock! ● Do not touch the inverter and its surrounding circuit with wet hand. Otherwise there will be danger of electric shock! ● Do not touch the inverter terminals (including control terminal). Otherwise there will be danger of electric shock! ● At power-on, the inverter will perform the security check of the external heavy-current circuit automatically. Thus, at the moment please do not touch the terminals U, V and W, or the terminals of motor, otherwise there will be danger of electric shock.
 Caution	● If parameter identification is required, due attention should be paid to the danger of injury arising from the rotating motor. Otherwise accident may occur! ● Do not change the factory settings at will. Otherwise it may damage the equipment!

1.1.6 During Operation:

 Danger	● Do not touch the fan or discharge resistor to sense the temperature. Otherwise, you may get burnt! ● Detection of signals during the operation should only be conducted by qualified technician. Otherwise, personal injury or equipment damage may be caused!
 Caution	● During the operation of the inverter, keep items from falling into the equipment. Otherwise, it may damage the equipment! ● Do not start and shut down the inverter by connecting and disconnecting the contactor. Otherwise, it may damage the equipment!

1.1.7 During Maintain:

 Danger	● Do not repair and maintain the equipment with power connection. Otherwise there will be danger of electric shock! ● Be sure to conduct repair and maintenance after the charge LED indictor of the inverter is OFF. Otherwise, the residual charge on the capacitor may cause personal injury! ● The inverter should be repaired and maintained only by the qualified person who has received professional training. Otherwise, it may cause personal injury or equipment damage! ● Carry out parameter setting after replacing the inverter, all the plug-ins must be plug and play when power outage.

1.2 Precautions

1.2.1 Motor Insulation Inspection

When the motor is used for the first time, or when the motor is reused after being kept, or when periodical inspection is performed, it should conduct motor insulation inspection so as to avoid damaging the inverter because of the insulation failure of the motor windings. The motor wires must be disconnected from the inverter during the insulation inspection. It is recommended to use the 500V megameter, and the insulating resistance measured should be at least 5MΩ.

1.2.2 Thermal Protection of the Motor

If the ratings of the motor does not match those of the inverter, especially when the rated power of the inverter is higher than the rated power of the motor, the relevant motor protection parameters in the in the inverter should be adjusted, or thermal relay should be mounted to protect the motor.

1.2.3 Running with Frequency higher than Standard Frequency

This inverter can provide output frequency of 0Hz to 600Hz. If the user needs to run the inverter with frequency of more than 50Hz, please take the resistant pressure of the mechanical devices into consideration.

1.2.4 Vibration of Mechanical Device

The inverter may encounter the mechanical resonance point at certain output frequencies, which can be avoided by setting the skip frequency parameters in the inverter.

1.2.5 Motor Heat and Noise

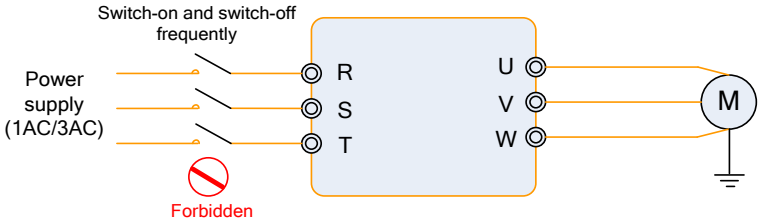
Since the output voltage of inverter is PWM wave and contains certain harmonics, the temperature rise, noise and vibration of the motor will be higher than those at power frequency.

1.2.6 Voltage-sensitive Device or Capacitor Improving Power Factor at the Output Side

Since the inverter output is PWM wave, if the capacitor for improving the power factor or voltage-sensitive resistor for lightning protection is mounted at the output side, it is easy to cause instantaneous over current in the inverter, which may damage the inverter. It is recommended that such devices not be used.

1.2.7 Switching Devices like Contactors Used at the Input and Output terminal

If a contactor is installed between the power supply and the input terminal of the inverter, it is not allowed to use the contactor to control the startup/stop of the inverter. If such contactor is unavoidable, it should be used with interval of at least one hour. Frequent charge and discharge will reduce the service life of the capacitor inside the inverter. If switching devices like contactor are installed between the output end of the inverter and the motor, it should ensure that the on/off operation is conducted when the inverter has no output. Otherwise the modules in the inverter may be damaged.



1.2.8 Use under voltage rather than rated voltage

If the KD series inverter is used outside the allowable working voltage range as specified in this manual, it is easy to damage the devices in the inverter. When necessary, use the corresponding step-up or step-down instruments to change the voltage.

1.2.9 Change Three-phase Input to Two-phase Input

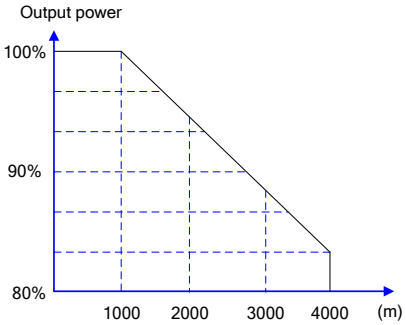
It is not allowed to change the KD series three-phase inverter into two-phase one. Otherwise, it may cause fault or damage to the inverter.

1.2.10 Lightning Impulse Protection

The series inverter has lightning over current protection device, and has certain self-protection capacity against the lightning. In applications where lightning occurs frequently, the user should install additional protection devices at the front-end of the inverter.

1.2.11 Altitude and Derating

In areas with altitude of more than 1,000 meters, the heat sinking effect of the inverter may turn poorer due to rare air. Therefore, it needs to derate the inverter for using. Please make selection as the below derating diagram.



1.2.12 Certain Special Use

If the user needs to use the inverter with the methods other than the recommended wiring diagram in this manual, such as shared DC bus, please consult our company.

1.2.13 Note of Inverter Disposal

The electrolytic capacitors on the main circuit and the PCB may explode when they are burnt. Emission of toxic gas may be generated when the plastic parts are burnt. Please dispose the inverter as industrial wastes.

1.2.14 Adaptable Motor

1) The standard adaptable motor is four-pole squirrel-cage asynchronous induction motor. If such motor is not available, be sure to select adaptable motors in according to the rated current of the motor. In applications where drive permanent magnetic synchronous motor is required, please consult our company;

2) The cooling fan and the rotor shaft of the non-variable-frequency motor adopt coaxial connection. When the rotating speed is reduced, the cooling effect will be poorer. Therefore, a powerful exhaust fan should be installed, or the motor should be replaced with variable frequency motor to avoid the over heat of the motor.

3) Since the inverter has built-in standard parameters of the adaptable motors, it is necessary to perform motor parameter identification or modify the default values so as to comply with the actual values as much as possible, or it may affect the running effect and protection performance;

4) The short circuit of the cable or motor may cause alarm or explosion of the inverter. Therefore, please conduct insulation and short circuit test on the newly installed motor and cable. Such test should also be conducted during routine maintenance. Please note that the inverter and the test part should be completely disconnected during the test.

Chapter 2 Product Information

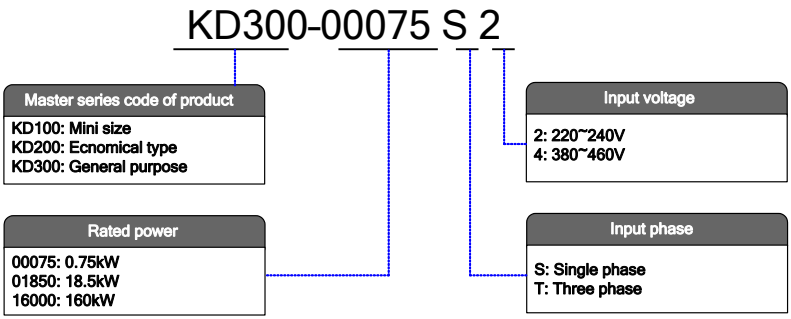
2.1 Product Inspection

Checking the following items when receiving the inverter

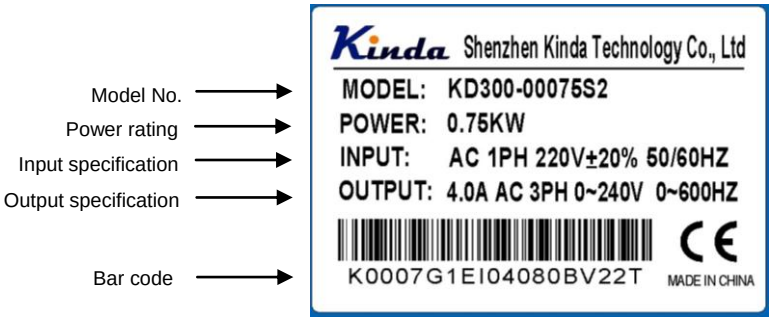
Confirmation Items	Method
Confirm if the inverter is what you ordered	Check name plate
Damaged or not	Inspect the entire exterior of the inverter to see if there are any scratches or other damage resulting from shipping
Confirm if the fastening parts (screws, etc.) are loose or not	Check with a screw driver if necessary
User's manual, certification and other spares	User's manual and the relative spares

Please contact the local agent or our company directly if there is any damage on the inverter.

2.2 Model Description



2.3 Description of Nameplate



2.4 Selection Guide

(1) KD100

Inverter Model	Motor		Rated Input Current (A)	Rated Output Current (A)
	kW	HP		
1AC 220~240V ±20%				
KD100-00004S2	0.4	0.5	5.4	2.3
KD100-00075S2	0.75	1	8.2	4
KD100-00150S2	1.5	2	14	7

(2) KD200

Inverter Model	Motor		Rated Input Current (A)	Rated Output Current (A)
	kW	HP		
1AC 220~240V±20%				
KD200-00075S2	0.75	1	8.2	4
KD200-00150S2	1.5	2	14	7
KD200-00220S2	2.2	3	24	9.6
3AC 380~440V±20%				
KD200-00075T4	0.75	1	3.4	2.5
KD200-00150T4	1.5	2	5.0	4.2
KD200-00220T4	2.2	3	5.8	5.5
KD200-00400T4	4.0	5	11	9.5
KD200-00550T4	5.5	7.5	14.6	13
KD200-00750T4	7.5	10	20.5	17

(3) KD300

Inverter Model	Motor		Rated Input Current (A)	Rated Output Current (A)
	kW	HP		
1AC 220~240V±20%				
KD300-00075S2	0.75	1	8.2	4
KD300-00150S2	1.5	2	14	7
KD300-00220S2	2.2	3	24	9.6
3AC 220~240V±20%				
KD300-00004T2	0.4	0.5	3.4	2.5
KD300-00075T2	0.75	1	5.0	4.2
KD300-00150T2	1.5	2	5.8	5.5
KD300-00220T2	2.2	3	11	9.5
KD300-00400T2	4.0	5	14.6	13
KD300-00550T2	5.5	7.5	20.5	17
KD300-00750T2	7.5	10	35	32
KD300-01100T2	11	15	46.5	45
KD300-01500T2	15	20	62.5	60
KD300-01850T2	18.5	25	76	75
KD300-02200T2	22	30	92	91
KD300-03000T2	30	40	113	112
KD300-03700T2	37	50	157	150
KD300-04500T2	45	60	180	176
KD300-05500T2	55	75	214	210
KD300-07500T2	75	100	307	304
3AC 380~440V±20%				
KD300-00075T4	0.75	1	3.4	2.1
KD300-00150T4	1.5	2	5.0	3.8
KD300-00220T4	2.2	3	6.8	6.0
KD300-00400T4	4.0	5	10	9
KD300-00550T4	5.5	7.5	15	13
KD300-00750T4	7.5	10	20	17
KD300-01100T4	11	15	26	25
KD300-01500T4	15	20	35	32
KD300-01850T4	18.5	25	38	37

KD300-02200T4	22	30	46	45
KD300-03000T4	30	40	62	60
KD300-03700T4	37	50	76	75
KD300-04500T4	45	60	92	90
KD300-05500T4	55	75	112	110
KD300-07500T4	75	100	157	152
KD300-09000T4	90	125	180	176
KD300-11000T4	110	150	214	210
KD300-13200T4	132	175	256	253
KD300-16000T4	160	210	307	304
KD300-18500T4	185	250	350	340
KD300-20000T4	200	260	385	380
KD300-22000T4	220	300	430	426
KD300-25000T4	250	330	468	465
KD300-28000T4	280	370	525	520
KD300-31500T4	315	420	590	585
KD300-35500T4	350	470	665	650
KD300-40000T4	400	530	785	725
KD300-45000T4	450	600	830	820
KD300-50000T4	500	660	880	880
KD300-56000T4	560	750	980	950
KD300-63000T4	630	840	1130	1100

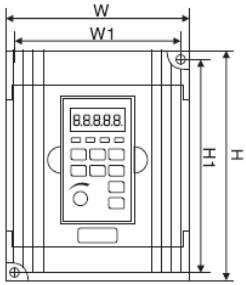
2.5 Technical Specifications

Item	Technical Index	Specification
Input	Input voltage	1AC/3AC 220~240V±20%, 3AC 380~460V±20%
	Input frequency	50/60Hz±5%
Output	Output voltage	0～rated input voltage
	Output frequency	0~600Hz
Control Features	Control mode	V/f control Sensorless vector control Torque control
	Operation command mode	Keypad control Terminal control Serial communication control (Modbus)
	Frequency setting mode	Digital setting, analog setting, pulse frequency setting, serial communication setting, multi-step speed setting & simple PLC, PID setting, etc. These frequency settings can be combinated & switched in various modes.
	Overload capacity	150% / 60s, 180% / 10s, 200% / 3s.
	Starting torque	0.5Hz/150% (SVC); 1Hz/150% (V/f)
	Speed adjustment range	1:100 (SVC), 1:50 (V/f)
	Speed control precision	±0.5% (SVC)
	Carrier frequency	1.0~16.0kHz, automatically adjusted according to temperature and load characteristics
	Frequency accuracy	Digital setting: 0.01Hz Analog setting: maximum frequency ×0.05%
	Torque boost	Automatically torque boost; manually torque boost: 0.1%~30.0%
	V/f curve	Three types: linear, multiple point and square type (1.2 power, 1.4 power, 1.6 power, 1.8 power, square)
	Acceleration/deceleration mode	Straight line/S curve; four kinds of acceleration/deceleration time, range: 0.1s~6553s
	Braking unit	0.4~18.5kW: build-in standard. >18.5kW, additional one should be connected if necessary.
	DC braking	DC braking when starting and stopping DC braking frequency: 0.0Hz~maximum frequency, braking time: 0.0s~25.0s
	Jog operation	Jog operation frequency: 0.0Hz~maximum frequency Jog acceleration/deceleration time: 0.1s~3600.0s

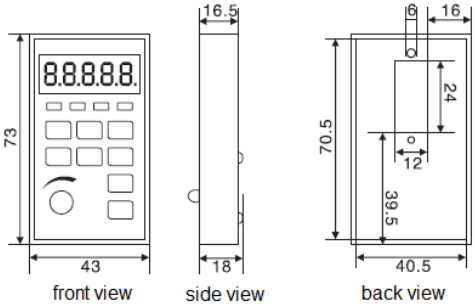
	Simple PLC & multi-step speed operation	It can realize a maximum of 16 multi-step speeds running via the built-in PLC or control terminal.
	Built-in PID	Built-in PID control to easily realize the close loop control of the process parameters (such as pressure, temperature, flow, etc.)
	Automatic voltage regulation	Keep output voltage constant automatically when input voltage fluctuating
Control Function	Torque control	Torque control without PG
	Torque limit	“Rooter” characteristics, limit the torque automatically and prevent frequent over-current tripping during the running process
	Wobble frequency control	Multiple triangular-wave frequency control, special for textile
	Timing/length/ counting control	Timing/length/counting control function
	Over-voltage & over-current stall control	Limit current & voltage automatically during the running process, prevent frequent over-current & over-voltage tripping
	Fault protection function	Comprehensive protections include over-current, over-voltage, under-voltage, overheating, default phase, overload, shortcut, etc., can record the detailed running status during failure & has fault automatic reset function
Input/out put terminals	Input terminals	Programmable digital input: 5 multifunctional inputs 2 programmable analog input: VI: 0～10V CI: 0～10V / 4～20mA
	Output terminals	Refer to typical wiring for details
	Communication terminals	Offer RS485 communication interface, support MODBUS-RTU communication protocol
Human machine interface	LED display	Display frequency setting, output frequency, output voltage, output current, etc. Two lines display
	Multifunction key	QUICK/JOG key, can be used as multifunction key
Environ-ment	Ambient temperature	-10℃～50℃, without direct sunshine.
	Humidity	90%RH or less (non-condensing)
	Altitude	≤1000M: output rated power, ＞1000M: output derated
	Storage temperature	-20℃～60℃

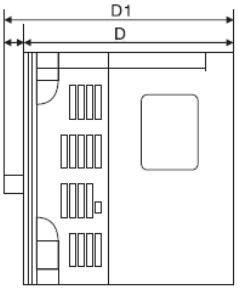
2.6 External and keypad dimensions

(1) KD100 & KD200

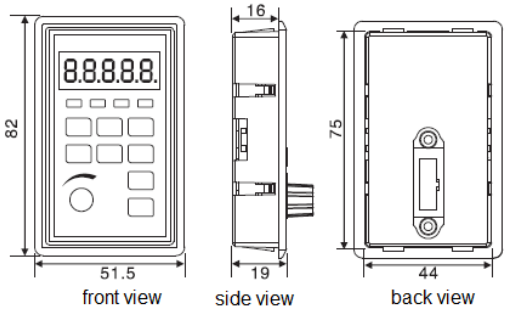


Keypad Dimension

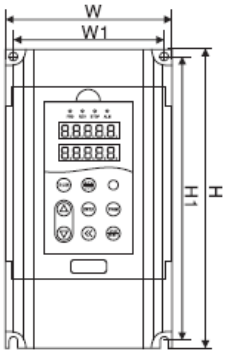




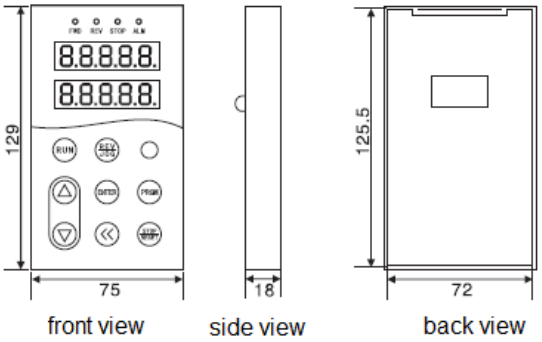
Keypad Bracket Dimension

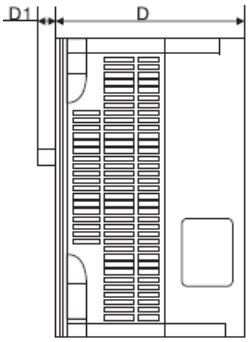


Model	H1	H	W	W1	D	D1
KD100-00004S2	132	142	85.5	74	113	123
KD100-00075S2						
KD100-00150S2						
KD200-00075S2	143	152	101	92	117	127
KD200-00150S2						
KD200-00220S2						
KD200-00075T4						
KD200-00150T4						
KD200-00220T4						

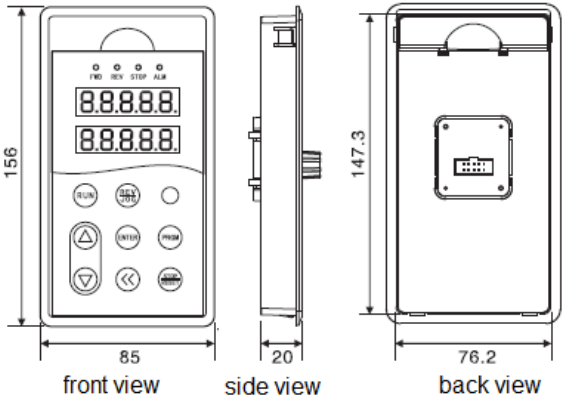


Keypad Dimension





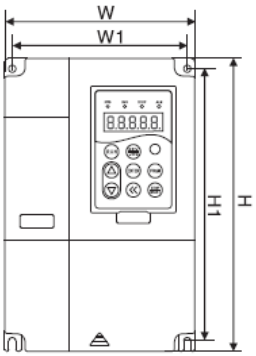
Keypad Bracket Dimension

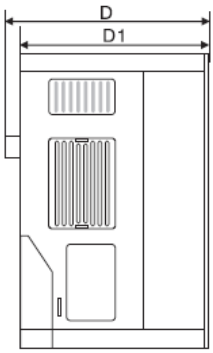


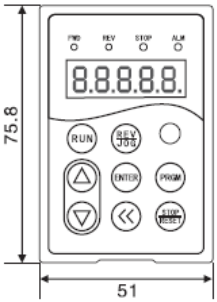
Model	W	W1	H	H1	D	D1
KD200-00400T4	130	115	264	244	153.5	9
KD200-00550T4						
KD200-00750T4						

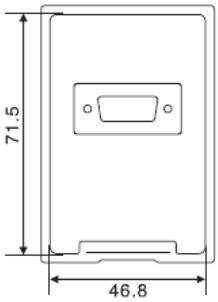
(2) KD300

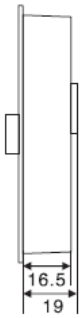
a. 0.4~2.2kW







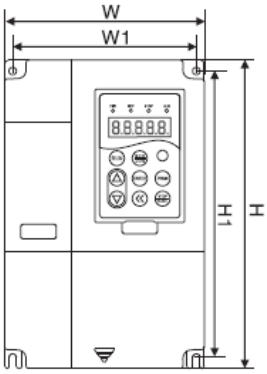


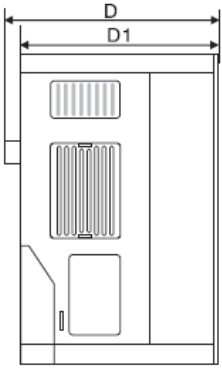


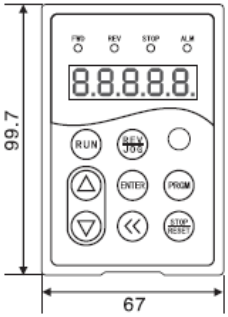
front view **back view** **side view**

Model	W	W1	H	H1	D	D1
KD300-00004S2	113	100.5	174	162.8	140	132
KD300-00075S2						
KD300-00150S2						
KD300-00220S2						
KD300-00075T4						
KD300-00150T4						
KD300-00220T4						

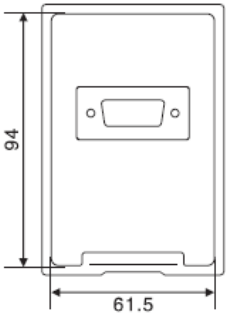
b. 4.0~7.5kW







front view

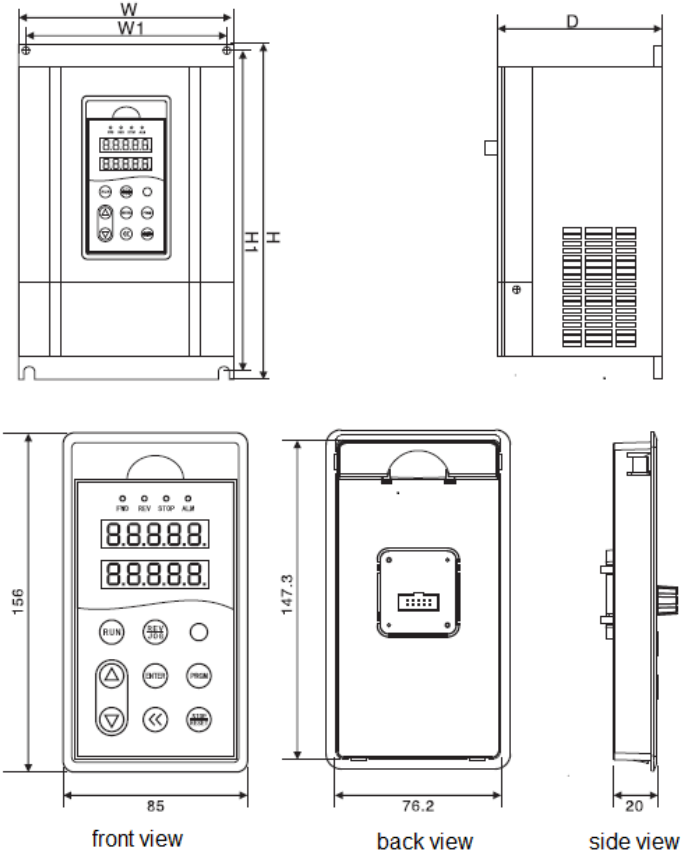


back view

side view

Model	W	W1	H	H1	D	D1
KD300-00400T4	160.7	146.7	246	232	155.5	147
KD300-00550T4						
KD300-00750T4						

c. >7.5kW



Model	H	W	D	H1	W1	Aperture
11~18.5kW	375	210	196	362.5	160	7
22~37kW	440	285	206	424	238	9
45~55kW	600	385	267.7	580	260	10
75~90KkW	659	413	327	635	293	12
110~160kW	849	480	389	822.5	369	12
185~280kW	1060	650	380.5	1030	420	12
315~450kW	1361.5	800	393	1300	520	16
500~630kW	1550	950	485	1475	560	16

2.7 Selection Guide of the external electrical parts

(1) Selection guide of electric cable

Inverter Model	Circuit Breaker (MCCB) (A)	Recommended Contactor A	Recommended Conducting Wire of Main Circuit at Input Side (mm^2)	Recommended Conducting Wire of Main Circuit at Output Side (mm^2)	Recommended Conducting Wire of Control Circuit (mm^2)
1AC 220~240V					
KD100-00004S2	16	10	2.5	2.5	1.0
KD300-00075S2	16	10	2.5	2.5	1.0
KD300-00150S2	20	16	4.0	2.5	1.0
KD300-00220S2	32	20	6.0	4.0	1.0
3AC 220~240V					
KD300-00004T2	10	10	2.5	2.5	1.0
KD300-00075T2	16	10	2.5	2.5	1.0
KD300-00150T2	16	10	2.5	2.5	1.0
KD300-00220T2	25	16	4.0	4.0	1.0
KD300-00400T2	32	25	4.0	4.0	1.0
KD300-00550T2	63	40	4.0	4.0	1.0
KD300-00750T2	63	40	6.0	6.0	1.0
KD300-01100T2	100	63	10	10	1.5
KD300-01500T2	125	100	16	10	1.5
KD300-01850T2	160	100	16	16	1.5
KD300-02200T2	200	125	25	25	1.5
KD300-03000T2	200	125	35	25	1.5
KD300-03700T2	250	160	50	35	1.5
KD300-04500T2	250	160	70	35	1.5
KD300-05500T2	350	350	120	120	1.5
KD300-07500T2	500	400	185	185	1.5
3AC 380~460V					
KD300-00075T4	10	10	2.5	2.5	1.0
KD300-00150T4	16	10	2.5	2.5	1.0
KD300-00220T4	16	10	2.5	2.5	1.0
KD300-00400T4	25	16	4.0	4.0	1.0
KD300-00550T4	32	25	4.0	4.0	1.0

KD300-00750T4	40	32	4.0	4.0	1.0
KD300-01100T4	63	40	4.0	4.0	1.0
KD300-01500T4	63	40	6.0	6.0	1.0
KD300-01850T4	100	63	6.0	6.0	1.5
KD300-02200T4	100	63	10	10	1.5
KD300-03000T4	125	100	16	10	1.5
KD300-03700T4	160	100	16	16	1.5
KD300-04500T4	200	125	25	25	1.5
KD300-05500T4	200	125	35	25	1.5
KD300-07500T4	250	160	50	35	1.5
KD300-11000T4	250	160	70	35	1.5
KD300-13200T4	350	350	120	120	1.5
KD300-16000T4	400	400	150	150	1.5
KD300-18500T4	500	400	185	185	1.5
KD300-20000T4	600	600	150*2	150*2	1.5
KD300-25000T4	600	600	150*2	150*2	1.5
KD300-28000T4	800	600	185*2	185*2	1.5
KD300-31500T4	800	800	185*2	185*2	1.5
KD300-35500T4	800	800	150*3	150*3	1.5
KD300-40000T4	800	800	150*4	150*4	1.5
KD300-45000T4	1000	1000	150*4	150*4	1.5
KD300-50000T4	1200	1200	180*4	180*4	1.5
KD300-56000T4	1200	1200	180*4	180*4	1.5
KD300-63000T4	1500	1500	180*4	180*4	1.5

(2) Selection guide of braking system

a. 1AC 220V

Inverter Model	Braking unit		Braking unit (100% of the braking torque, 10% of the utilization rate)		
	Specification	Quantity	Equivalent braking resistor	Equivalent braking power	Quantity
KD100-00004S2	Build-in	1	200Ω	80W	1
KD300-00075S2		1	150Ω	80W	1
KD300-00150S2		1	100Ω	100W	1
KD300-00220S2		1	70Ω	100W	1

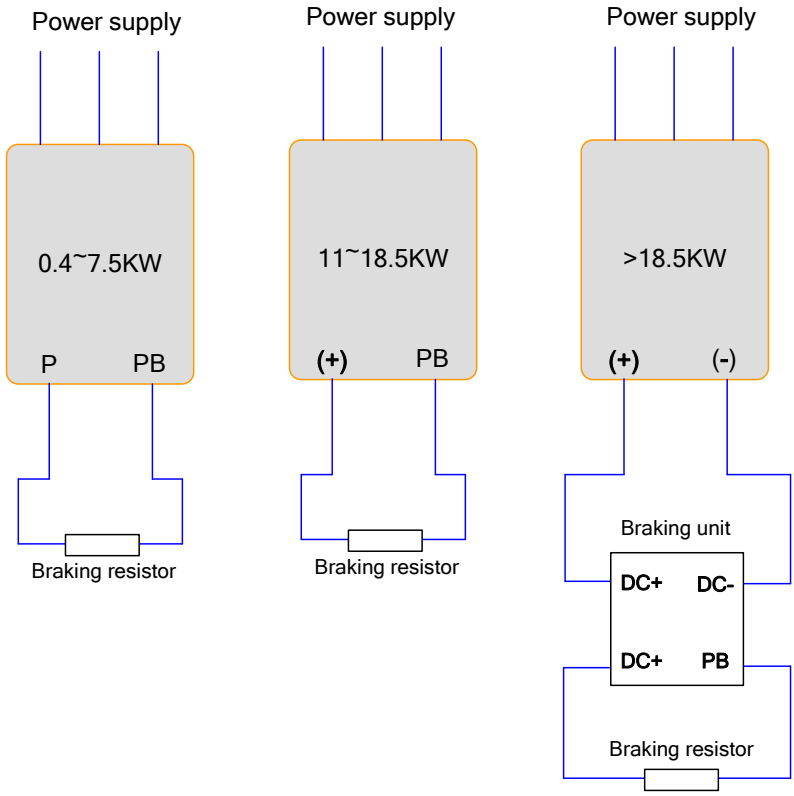
b. 3AC 220V

Inverter Model	Braking unit		Braking unit (100% of the braking torque, 10% of the utilization rate)		
	Specification	Quantity	Equivalent braking resistor	Equivalent braking power	Quantity
KD300-00075T2	Build-in	1	110Ω	150W	1
KD300-00150T2		1	100Ω	260W	1
KD300-00220T2		1	80Ω	260W	1
KD300-00400T2		1	48Ω	400W	1
KD300-00550T2		1	35Ω	550W	1
KD300-00750T2		1	26Ω	780W	1
KD300-01100T2	KBU-055-2	1	17Ω	1100W	1
KD300-01500T2		1	13Ω	1800W	1
KD300-01850T2		1	10Ω	2000W	1
KD300-02200T2		1	8Ω	2500W	1
KD300-03000T2	KBU-055-2	2	13Ω	1800W	2
KD300-03700T2		2	10Ω	2000W	2
KD300-04500T2		2	8Ω	2500W	2
KD300-05500T2		2	6.5Ω	3000W	2
KD300-07500T2		2			

c. 3AC 380V

Inverter Model	Braking unit		Braking unit (100% of the braking torque, 10% of the utilization rate)		
	Specification	Quantity	Equivalent braking resistor	Equivalent braking power	Quantity
KD300-00075T4	Build-in	1	300Ω	150W	1
KD300-00150T4		1	220Ω	260W	1
KD300-00220T4		1	150Ω	390W	1
KD300-00400T4		1	150Ω	390W	1
KD300-00550T4		1	100Ω	520W	1
KD300-00750T4		1	50Ω	1040W	1
KD300-01100T4		1	50Ω	1040W	1
KD300-01500T4		1	40Ω	1560W	1
KD300-01850T4		1	20Ω	6000W	1
KD300-02200T4	KBU-055-4	1	20Ω	6000W	1
KD300-03000T4		1	20Ω	6000W	1
KD300-03700T4		1	13.6Ω	9600W	1
KD300-04500T4		1	13.6Ω	9600W	1
KD300-05500T4		1	13.6Ω	9600W	1
KD300-07500T4		2	13.6Ω	9600W	2
KD300-09000T4		2	13.6Ω	9600W	2
KD300-11000T4		2	13.6Ω	9600W	2
KD300-13200T4	KBU-160-4	1	4Ω	30000W	1
KD300-16000T4		1	4Ω	30000W	1
KD300-18500T4	KBU-220-4	1	3Ω	40000W	1
KD300-20000T4		1	3Ω	40000W	1
KD300-22000T4		1	3Ω	40000W	1
KD300-25000T4	KBU-315-4	1	2Ω	60000W	1
KD300-28000T4		1	2Ω	60000W	1
KD300-31500T4		1	2Ω	60000W	1
KD300-35500T4	KBU-220-4	2	3Ω	40000W	2
KD300-40000T4		2	3Ω	40000W	2
KD300-45000T4		2	2.5Ω	45000W	2
KD300-50000T4	KBU-315-4	2	2Ω	60000W	2

d. Wiring connection of braking system



2.8 Routine Maintenance of Inverter

2.8.1 Routine Maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the inverter, which may cause potential fault of the inverter or reduce the service life of the inverter. Therefore, it is necessary to carry out routine and periodical maintenance on the inverter.

Routine inspection Items include:

1) Whether there is any abnormal change in the running sound of the motor;

2) Whether the motor has vibration during the running;

3) Whether there is any change to the installation environment of the inverter;

4) Whether the inverter cooling fan works normally;

5) Whether the inverter has over temperature.

Routine cleaning:

1) The inverter should be kept clean all the time.

2) The dust on the surface of the inverter should be effectively removed, so as to prevent the dust entering the inverter. Especially the metal dust is not allowed.

3) The oil stain on the inverter cooling fan should be effectively removed.

2.8.2 Periodic Inspection

Please perform periodic inspection on the places where the inspection is a difficult thing.

Periodic inspection Items include:

1) Check and clean the air duct periodically;

2) Check if the screws are loose;

3) Check if the inverter is corroded;

4) Check if the wire connector has arc signs;

5) Main circuit insulation test.

Remainder: When using the megameter (DC 500V megameter recommended) to measure the insulating resistance, the main circuit should be disconnected with the inverter. Do not use the insulating resistance meter to test the insulation of control circuit. It is not necessary to conduct the high voltage test (which has been completed upon delivery).

2.8.3 Replacement of Vulnerable Parts for Inverter

The vulnerable parts of the inverter include cooling fan and filter electrolytic capacitor, whose service life depends on the operating environment and maintenance status. General service life is shown as follows:

Part Name	Service Life
Fan	2~3 years
Electrolytic capacitor	4~5 years

The user can determine the year of replacement according to the operating time.

1) Cooling fan

Possible reason for damage: Bearing is worn and blade is aging.

Judging criteria: Whether there is crack on the blade and whether there is abnormal vibration noise upon startup.

2) Filter electrolytic capacitor

Possible reason for damage: Input power supply in poor quality, high ambient temperature, frequent load jumping, and electrolyte aging.

Judging criteria: Whether there is liquid leakage and whether the safe valve has projected, and measure the static capacitance, and the insulating resistance.

2.8.4 Storage of Inverter

Upon acquiring the inverter, the user should pay attention to the following points regarding the temporary

and long-term storage of the inverter:

1) Pack the inverter with original package and place back into the packing box of our company.

2) Long-term storage will degrade the electrolytic capacitor. Thus, the product should be powered up once every 2 years, each time lasting at least five hours. The input voltage should be increased slowly to the rated value with the regulator.

2.9 Instructions on Warranty of Inverter

Free warranty only applies to the inverter itself.

1) Kinda provides 18 month warranty (starting from the date of original shipment as indicated on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

2) Reasonable repair expenses will be charged for the following situations within 20 months:

a)The equipment is damaged because the user fails to comply with the requirements of the user's manual;

b) Damage caused by fire, flood and abnormal voltage;

3) Damage caused when the inverter is used for abnormal function.

The service expenses will be calculated according to the standard of the manufacturer. If there is any agreement, the agreement should prevail.

Chapter 3 Installation and wiring

3.1 Mechanical Installation

3.1.1 Installation environment

1) Ambient temperature: The ambient temperature exerts great influences on the service life of the inverter and is not allowed to exceed the allowable temperature range (-10℃ to 50℃).

2) The inverter should be mounted on the surface of incombustible articles, with sufficient spaces nearby for heat sinking. The inverter is easy to generate large amount of heat during the operation. The inverter should be mounted vertically on the base with screws.

3) The inverter should be mounted in the place without vibration or with vibration of less than 0.6G, and should be kept away from such equipment as punching machine.

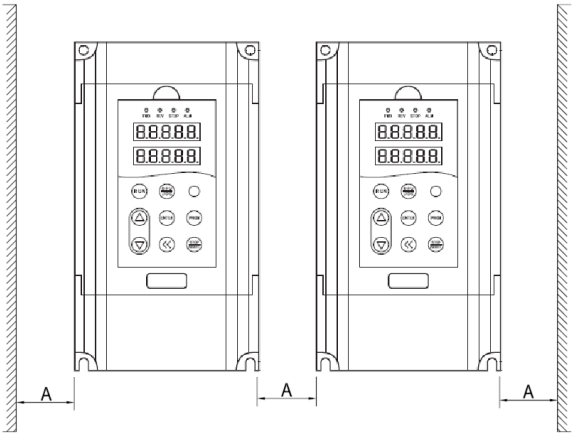
4) The inverter should be mounted in locations free from direct sunlight, high humidity and condensate.

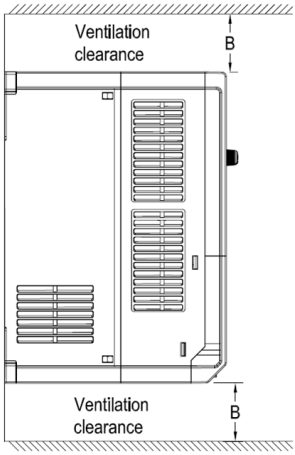
5) The inverter should be mounted in locations free from corrosive gas, explosive gas or combustible gas.

6) The inverter should be mounted in locations free from oil dirt, dust, and metal powder.

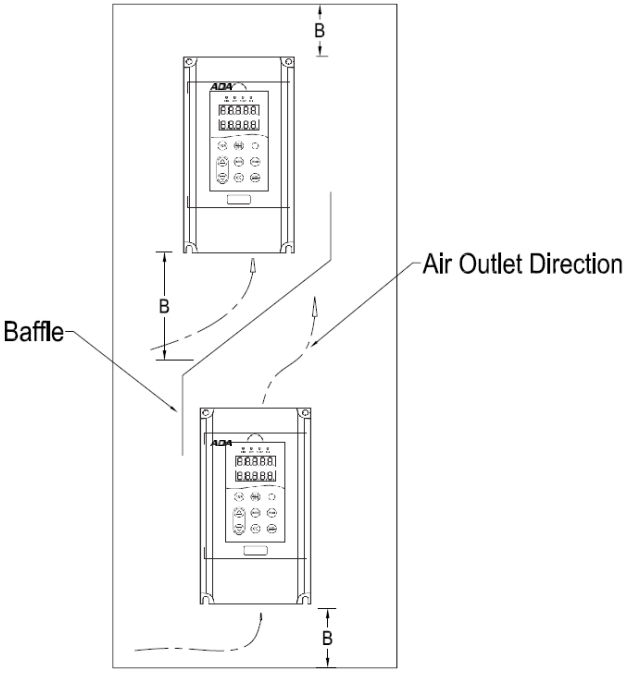
3.1.2 Installation diagram

a. Multiple inverters parallel installation





b. Multiple inverters vertical installation



Requirement of minimum mounting clearances

Drive model	Mounting clearances (mm)	
	A	B
0.75～15kW	≥50	≥100
18.5～45kW	≥50	≥200
55kW and above	≥150	≥300

3.1.3 Heat dissipation should be taken into account during the mechanical installation. Please pay attention the following items:

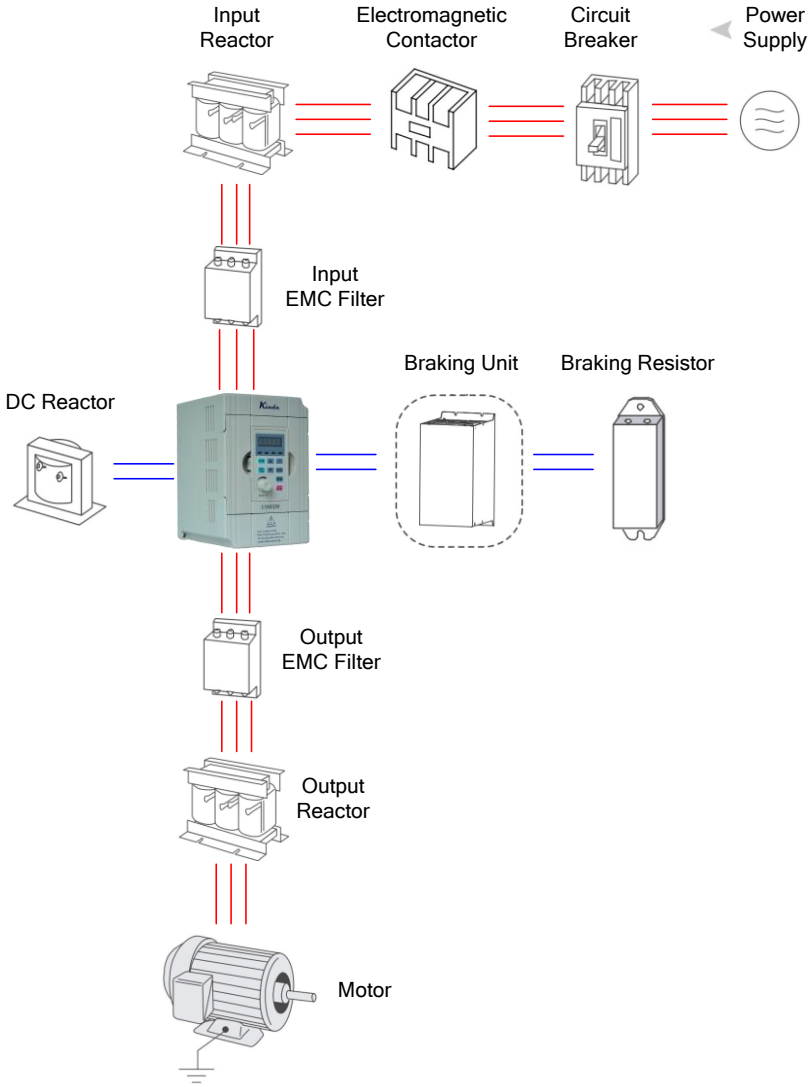
1) Install the inverter vertically so that the heat may be expelled from the top. However, the equipment cannot be installed upside down. If there are multiple inverters, parallel installation is a better choice. In applications where the upper and lower inverters need to be installed, please refer to 3.1.2 “KD Series Inverter Installation Diagram” and install an insulating splitter.

2) The mounting space should be as indicated as 3.1.2, so as to ensure the heat dissipation space of the inverter. However, the heat dissipation of other devices in the cabinet should also be taken into account.

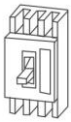
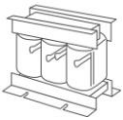
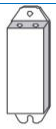
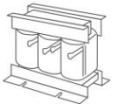
3) The installation bracket must be flame retardant.

4) In the applications where there are metal dusts, it is recommended to mount the radiator outside the cabinet. In this case, the space in the sealed cabinet should be large enough.

3.2 Configuration of Peripheral Devices



Instructions of peripheral devices

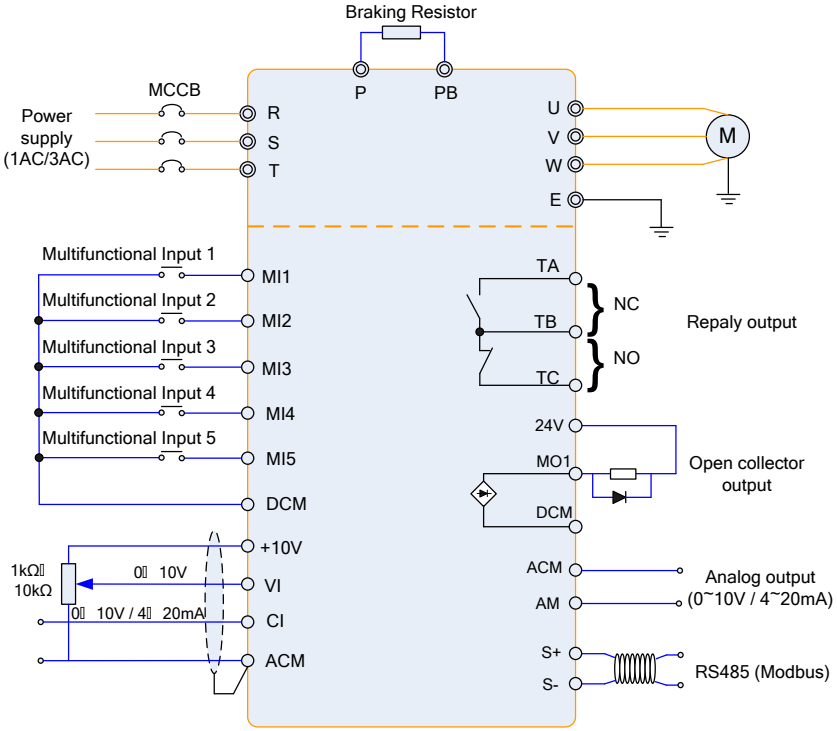
Picture	Device	Instructions
	Cable	Transmitting electrical signals.
	Circuit breaker	Purpose: disconnect power supply and protect the equipment in case of abnormal overcorrect occurs Type selection: breaking current of circuit breaker is defined to be 1.5～2 times the rated current of the drive Breaking time characteristic of circuit breaker should be selected based on overload protection time characteristic of the drive
	Input reactor	Improve power factor Reduce the impact of imbalanced three-phase input AC power supply on the system Suppress higher harmonics and reduce the conducted and radiated interference to peripheral devices Restrict the impact of impulse current on rectifier bridges
	Input EMC filter	Reduce conducted interference from power supply to the drive, improve the immunity of the drive from noise Reduce conducted and radiated interference of the drive to peripheral device
	Braking resistor	Purpose: consume motor feedback energy to realize quick brake
	Output EMC filter	Output filter and radiated interference of the drive to peripheral devices
	Output reactor	Avoid the motor insulation damage result from harmonic voltage Reduce frequent protection from the drive caused by leakage current In case the cable connecting drive and motor is over 100 meters, output AC reactor recommended

- Do not install the capacitor or surge suppressor at the output side of the inverter, otherwise it may cause inverter failure or capacitor and surge suppressor damaged.

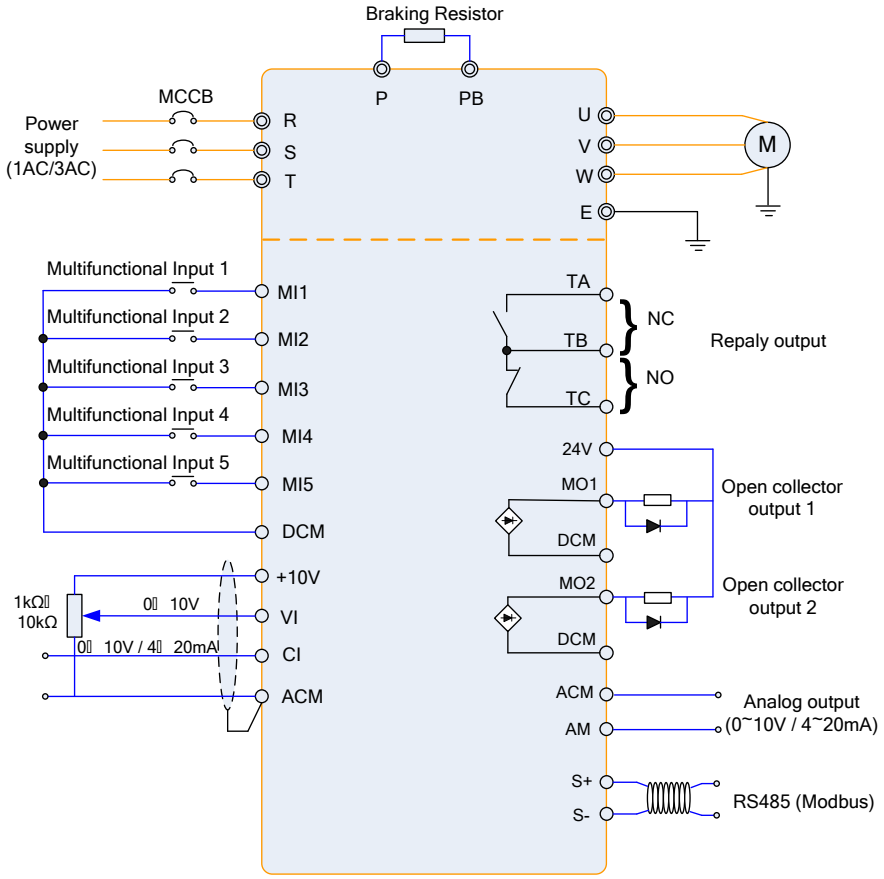
- The Inverter input / output (main circuit) contains harmonic components, it may interfere with inverter accessories communications equipment. Therefore, please install anti-interference filter to minimize interference.
- The details of external devices and accessories selection refer to the manual of external devices.

3.2.4 Wiring diagram

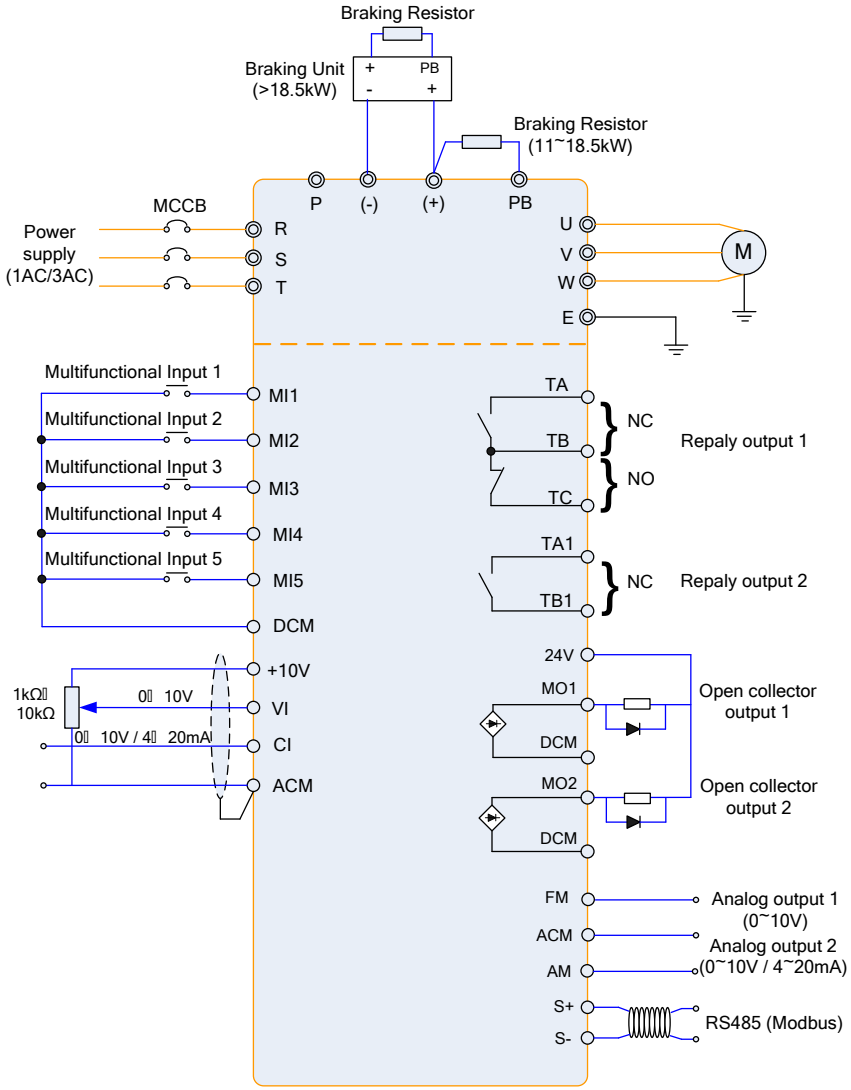
a. Wiring Diagram (0.4~2.2kW)



b. Wiring Diagram (4~7.5kW)



c. Wiring Diagram (>7.5kW)



Note:

1. Terminal ◎ refers to the main circuit terminal, terminal O refers to the control circuit terminal.
2. Built-in braking unit is standard in the inverters below 18.5kW (include).
3. Braking resistor is optional for user.

3.2.5 Main circuit terminals and connections

Danger

- Make sure that the power switch is at OFF status prior to perform wiring connection. Otherwise there may be danger of electric shock!
- Only the qualified and trained personnel can perform wiring connection. Otherwise it may cause equipment and human injuries!
- It should be earthed reliably. Otherwise there may be danger of electric shock or fire!

Caution

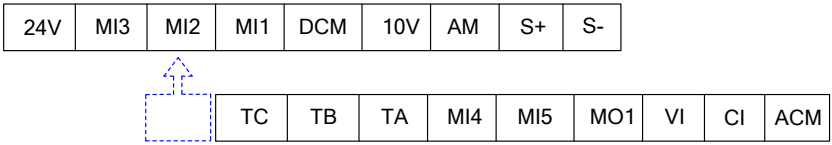
- Make sure that the rated value of the input power supply is consistent with that of the inverter. Otherwise it may damage the inverter!
- Make sure that the motor matches the inverter. Otherwise it may damage the motor or generate inverter protection!
- Do not connect the power supply to the terminals of U, V and W. Otherwise it may damage the inverter!
- Do not directly connect the brake resistor between the DC bus terminals (+) and (-). Otherwise it may cause fire!

Instructions of main circuit terminals

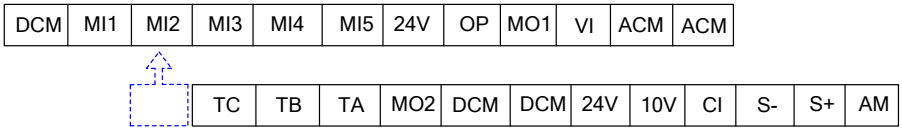
Terminal	Description
R, S, T	Connect to three-phase AC power
(+), (-)	Reserved terminals for external brake unit (>18.5kW)
P, PB	Reserved terminals for braking resistor (0.4kW~7.5kW)
(+), PB	Reserved terminals for braking resistor (11kW~18.5kW)
P1, (+)	Reserved terminals for external DC reactor
U, V, W	Connect to three phase motor
⏚	Ground connection terminal

3.2.6 Control terminals and connections

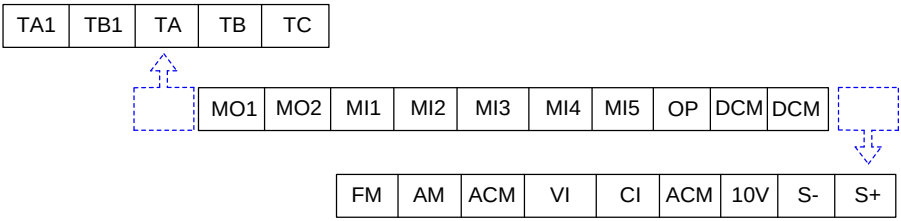
1) Control circuit terminals (0.4~2.2kW)



2) Control circuit terminals (4~7.5kW)



3) Control circuit terminals (>11kW)



3.2.7 Description of jumpers on control board

Jumper	connection	Description
J5	Short connect 1 & 2	AM output 4~20mA (Default)
	Short connect 2 & 3	AM output 0~10V
J8	Short connect 1 & 2	CI input 0~10V
	Short connect 2 & 3	CI input 4~20mA (Default)
J9	Short connect 1 & 2	24V short connect with OP (Default)
	Short connect 2 & 3	DCM short connect with OP
J14	Short connect 1 & 2	Connect RS485 terminal resistor
	Short connect 2 & 3	Disconnect RS485 terminal resistor

Description of Control Terminal Function

Type	Terminal Symbol	Terminal Name	Function Description
Power Supply	+10V~ ACM	External +10V power	Provide +10V power supply for external units, and the maximum output current is 100mA. It is generally used as the operating power supply for the external potentiometer. The potentiometer resistance range is 1kΩ~10kΩ.
	+24V~ DCM	External +24V power	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminals and the external sensor. The maximum output current is 150mA.
	OP	External power input terminal	Short connect with 24V as default. When external signal is used to drive MI1 ~ MI5, OP needs to connect to the external power supply and disconnect from the +24V power terminal
Analog Input	VI~ACM	Analog input terminal 1	1. Input range: DC 0V~10V. 2. Input impedance: 2.2kΩ.
	CI~ACM	Analog input terminal 2	1. Input range: DC 0V~10V/4mA~20mA, determined by J8 jumper on the control board. 2. Input impedance: 500Ω.
Digital Input	MI1	Digital input 1	1. Optical coupling isolation, compatible with dual polarity input 2. Input impedance: 2.4kΩ 3. Voltage range for level input: 9V～30V
	MI2	Digital input 2	
	MI3	Digital input 3	
	MI4	Digital input 4	
	MI5	Digital input 5	
Analog Output	FM~ACM	Analog output 1	Output voltage range: 0V ~ 10V
	AM~ACM	Analog output 2	The voltage or current output is determined by J5 jumper on the control board. Output voltage range: 0V ~ 10V. Output current range: 0mA ~ 20mA.

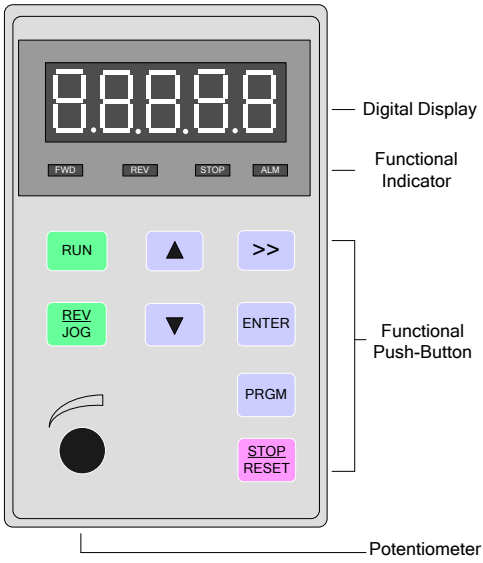
Digital Output	MO1	open collector output	Correspond common terminal is DCM. External connection voltage range: 0~24V Output current range: 0mA~50mA
	MO2		
Relay Output 1	TB-TC	Normally close terminal	Driving capacity: AC 250V/3A, DC 30V/1A
	TB-TA	Normally open terminal	
Relay Output 2	TA1-TB1	Normally open terminal	Driving capacity: AC 250V/3A DC 30V/A
RS485	S+	RS485+	Communication interface of Modbus, it is suggested to use twisted-pair cable or shielded cable.
	S-	RS485-	

Chapter 4 Operation and Display

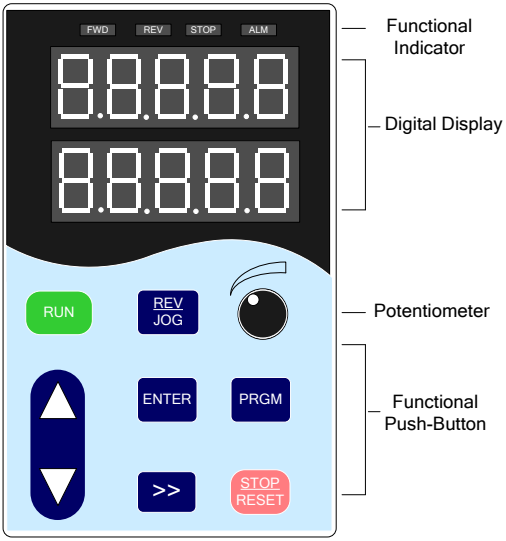
4.1 Keypad Description

With the operation keypad, it can perform such operations on the inverter as function parameter modification, working status monitor and running control (start and stop).

(1) Keypad of KD100 and KD200



(2) Keypad of KD300 (two lines display)



1) Function keys description

Functional indicator	Description
FWD	Indication of inverter forward running
REW	Indication of inverter reverse running
STOP	Inverter is stopping
ALM	Inverter with fault

2) Digital display zone

Five-number digit LED display, can display setting frequency, output frequency, various monitoring data and alarm code.

The first line LED display of two lines keypad is operated and displayed the same like single line LED keypad. The second line LED displays the parameters of F7-08, the default value is 04, displays the output current. If customers need to display other parameters, just change F7-08.

3) Keypad push-button description

Button	Name	Function
PRGM	Programming key	Entry and exit of primary menu
ENTER	Confirmation key	Progressively enter menu, and confirm parameters
▲	Increment key	Progressively increase of data or function codes
▼	Decrement key	Progressively decrease of data or function codes
>>	Shift key	Select the displayed parameters in turn on the stop display interface and running display interface, and select the modification bit of parameters when modifying parameters.
RUN	Running key	Start to run inverter under keyboard control mode
STOP RESET	Stop / Reset	Stop inverter in running status and reset operation in fault alarm status. The reactions are controlled by F7-02.
REV JOG	Multi-function selection key	The corresponding functions are defined by F7-01.

4.2 Function Code Checking and Modification Methods Description

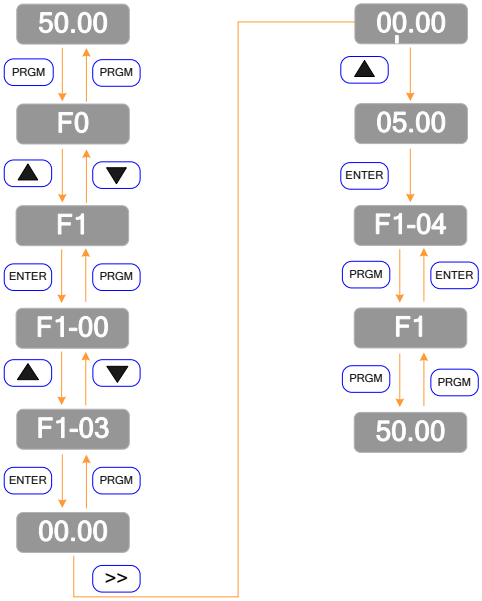
The operation keypad of the KD Series Inverter adopts three-level menu structure to carry out operations such as parameter setting.

1） Function parameter group (level 1 menu)
2） Function code (level 2 menu)
3） Function code setting value (level 3 menu)

Description: When operating on level 3 menu, press **PRGM** key or **ENTER** key to return to level 2 menu. The difference between **PRGM** key and **ENTER** key is described as follows:

1） Pressing **ENTER** key will save the setup parameter and return to the level 2 menu and then automatically shift to the next function code.
2） Pressing **PRGM** key will directly return to level 2 menu without saving the parameter, and it will return to the current function code.

Example: Modify the function code F1-03 from 00.00Hz to 05.00Hz.



In level 3 menu, if there is no flashing bit, it means this function code cannot be modified. The possible reasons are:

1) The function code is an unchangeable parameter, such as actual detection parameter, running record parameter, etc.

2) The function code cannot be modified in running status. It can be modified only when the inverter is stopped.

4.3 Power-on Initialization

Firstly the system initializes during the inverter power-on, and LED displays “8.8.8.8.8.8”. After initialization, the inverter is in fault protection status if a fault happens, or the inverter is in stand-by status

4.4 Fault Protection

In fault status, inverter will display fault code & record output current, output voltage, etc. For details, please refer to FA (fault and protection) parameter group. Fault can be reset via STOP/RESET key or external terminals.

4.5 Stand By

In stop or stand by status, parameters of multi-status can be displayed. Whether or not to display this parameter can be chosen through function code F7-05 (Stop status display parameter) according to binary bits.

The displaying of the chosen parameters can be switched in sequence by pressing >> button.

4.6 Running

In running status, there are thirty two parameters can be chosen to display or not through function code F7-03 and F7-04 (running status display parameter) according to binary bits.

The displaying of the chosen parameters can be switched in sequence by pressing >> button.

4.7 Password Setting

The inverter provides user password protection function. When F7-00 is set to non-zero value, it indicates the user password, and the password protection turns valid after exiting the function code editing status. When pressing **PRGM** key again, "------"will be displayed, and common menu cannot be entered until user password is input correctly.
To cancel the password protection function, enter with password and set F7-00 to "0".

4.8 Motor Parameters Autotuning

To select the vector control running mode, it must input the nameplate parameter of the motor accurately prior to the running of the inverter. The Inverter will select standard motor parameters matching the nameplate parameter. Since the vector control mode relies highly on the motor parameters, it must acquire the accurate parameters of the controlled motor to ensure the good control performance.

The procedures for the automatic tuning of motor parameters are described below:

First, select the command source (F0-02) as the command channel of the operation keypad. Second, input the following parameters in accordance with the actual motor parameters:
F2-01: Rated motor power
F2-02: Rated motor voltage
F2-03: Rated motor current
F2-04: Rated motor frequency
F2-05: Rated rotation speed of motor

If the motor is completely disconnected from the load, set F2.11 to "2" (complete tuning), and press **RUN** key on the keypad, it will display "RUN", motor will rotate, and it will stop automatically while autotuning finish, the keypad will display "END". After autotuning the following parameters will be updated :
F2-06: Stator resistance
F2-07: Rotor resistance
F2-08: Leakage inductance
F2-09: Mutual inductance
F2-10: Current without load

Finally, complete the automatic tuning of motor parameters.

If the motor cannot be completely disconnected with the load, set F2-11 to "1" (static tuning), and then press **RUN** key on the keyboard panel, wait until the autotuning finish.

The following motor parameters will be updated automatically:
F2-06: Stator resistance
F2-07: Rotor resistance
F2-08: Leakage inductive reactance

Chapter 5 Function Parameter List

The detailed functional parameters are listed in below table.

The instruction of the symbols in function parameter list is as following:

"○" Means the parameter can be modified at stop and running status.

"◎" Means the parameter cannot be modified at the running status.

"●" Means the parameter is the real detection value which cannot be modified.

5.1 Basic Function Parameter Table

Function code	Name	Detailed instruction	Factory default	Modify
F0 Group: Basic Function				
F0-00	Inverter model	1: G model (constant torque load model) 2: P model (fan and pump load model)	1	●
F0-01	Control mode	0: Sensorless Vector Control (SVC) 1: Reserved 2: V/F control	2	◎
F0-02	Running command source	0: Keypad (LED OFF) 1: Terminal (LED ON) 2: Communication (LED flickers)	0	◎
F0-03	Main frequency source A selection	0: Keypad (F0-08, UP and DOWN Adjustable, non-recorded after power off) 1: Keypad potentiometer 2: VI (0~10V) 3: CI (0~10V / 4~20mA) 4: Reserved 5: Reserved 6: Multi-step speed 7: Simple PLC 8: PID 9: Communication (Modbus)	1	◎
F0-04	Auxiliary frequency source B selection	The same as F0-03	0	◎
F0-05	Reference of Frequency source B	0: Relative to maximum frequency 1: Relative to frequency source A	0	○
F0-06	Range of Auxiliary Frequency source B	0%～150%	100%	○
F0-07	Frequency source selection	Units place: frequency source selection 0: Main frequency source A 1: Calculation result of frequency A and B (determined by tens place) 2: Switching between A and B 3: Switching between A and calculation result 4: Switching between B and calculation result Tens place: calculation relationship between frequency A and B 0: A + B 1: A - B	00	○

Function code	Name	Detailed instruction	Factory default	Modify
		2: Max (A, B) 3: Min (A, B)		
F0-08	Keypad reference frequency	0.00Hz ~ maximum frequency:F0-10	50.00Hz	○
F0-09	Running direction selection	0: Forward 1: Reverse	0	○
F0-10	Maximum frequency	50.00Hz ~ 600.00Hz	50.00Hz	◎
F0-11	Frequency source of upper limit	0: F0-12 1: VI 2: CI 3: Reserved 4: Reserved 5: Communication	0	◎
F0-12	Frequency upper limit	F0-14 (frequency lower limit) ~ F0-10 (max. frequency)	50.00Hz	○
F0-13	Frequency upper limit offset	0.00Hz ~ F0-10 (max. frequency)	0.00Hz	○
F0-14	Frequency lower limit	0.00Hz ~ F0-12 (frequency upper limit)	0.00Hz	○
F0-15	Carrier frequency	1.0kHz ~ 16.0kHz	Model depend	○
F0-16	Carrier frequency adjusting according to temperature	0: No 1: Yes	1	○
F0-17	Acceleration time 1	0.01s ~ 36000s	Model depend	○
F0-18	Deceleration time 1	0.01s ~ 36000s	Model depend	○
F0-19	ACC/DEC time unit	0: 1s 1: 0.1s 2: 0.01s	1	◎
F0-20	Reserved			
F0-21	Auxiliary frequency source offset frequency when combination	0.00Hz ~ F0-10 (max. frequency)	0.00Hz	○
F0-22	Frequency command resolution	1: 0.1Hz 2: 0.01Hz	2	◎
F0-23	Digital setting frequency storage selection when stop	0: Not store 1: store	1	○
F0-24	ACC/DEC time reference frequency	0: F0-10 (max. frequency) 1: Setting frequency	0	◎

Function code	Name	Detailed instruction	Factory default	Modify
		2: 100Hz		
F0-25	Running frequency command UP/DOWN reference	0: Running frequency 1: Setting frequency	0	◎
F0-26	Command source combination with frequency source	Units place: Operation keypad command combination with frequency source 0: No combination 1: Keypad Potentiometer 2: VI 3: CI 4: Reserved 5: Reserved 6: Multi-step speed 7: Simple PLC 8: PID 9: Communication Tens place: Terminal command combination with frequency source Hundreds place: Communication command combination with frequency source	000	○
F0-27	Parameters initialization	0: No action 1: Initialize basic parameters (F0 and F1 groups) 2: Clear the record 3: Initialized completely	0	◎
F1 Group: Start and Stop control				
F1-00	Start mode	0: Direct start 1: Speed tracking and restart 2: Pre-excitation start	0	○
F1-01	Speed tracking mode	0: Begin from stop frequency 1: Begin from zero speed 2: Begin from maximum frequency	0	◎
F1-02	Speed tracking speed	1 ~ 100	20	○
F1-03	Start frequency	0.00Hz ~ 10.00Hz	0.00Hz	○
F1-04	Start frequency holding time	0.0s ~ 100.0s	0.0s	◎
F1-05	DC braking current before start/pre-excitation current	0% ~ 100%	0%	◎

Function code	Name	Detailed instruction	Factory default	Modify
F1-06	DC braking time before start/pre-excitation time	0.0s ~ 100.0s	0.0s	◎
F1-07	ACC/DEC mode	0: Linear ACC/DEC 1: S-curve ACC/DEC A 2: S-curve ACC/DEC B	0	◎
F1-08	Time of S curve's start part	0.0% ~ (100.0% ~ F1-09)	30.0%	◎
F1-09	Time of S curve's end part	0.0% ~ (100.0% ~ F1-08)	30.0%	◎
F1-10	Stop mode	0: Deceleration to stop 1: Coast to stop	0	○
F1-11	DC braking start frequency while stopping	0.00Hz ~ F0-10 (maximum frequency)	0.00Hz	○
F1-12	DC braking delay time while stopping	0.0s ~ 100.0s	0.0s	○
F1-13	DC braking current while stopping	0% ~ 100%	0%	○
F1-14	DC braking time while stopping	0.0s ~ 100.0s	0.0s	○
F1-15	Braking usage ratio	0% ~ 100%	100%	○
F2 Group: Motor Parameters				
F2-00	Motor type	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	◎
F2-01	Motor rated power	0.1kW ~ 1000.0kW	Model depend	◎
F2-02	Motor rated voltage	1V ~ 2000V	Model depend	◎
F2-03	Motor rated current	0.01A ~ 655.35A (Inverter power≤55kW) 0.1A ~ 6553.5A (Inverter power＞55kW)	Model depend	◎
F2-04	Motor rated frequency	0.00Hz ~ F0-10 (max. frequency)	Model depend	◎
F2-05	Motor rated speed	1 ~ 36000RPM	Model depend	◎
F2-06	Motor stator resistance	0.001Ω ~ 65.535Ω (Inverter power≤55kW) 0.0001Ω ~ 6.5535Ω (Inverter power＞55kW)	Motor paramet er	◎
F2-07	Motor rotor resistance	0.001Ω ~ 65.535Ω (Inverter power≤55kW)	Motor paramet	◎

Function code	Name	Detailed instruction	Factory default	Modify
		0.0001Ω ~ 6.5535Ω (Inverter power＞55kW)	er	
F2-08	Motor leakage inductance	0.01mH ~ 655.35mH (Inverter power≤55kW) 0.001mH ~ 65.535mH (Inverter power＞55kW)	Motor paramet er	◎
F2-09	Motor mutual inductance	0.01mH ~ 655.35mH (Inverter power≤55kW) 0.001mH ~ 65.535mH (Inverter power＞55kW)	Motor paramet er	◎
F2-10	Motor no-load current	0.01A ~ F2-03 (rated current) (Inverter power≤55kW) 0.1A ~ F2-03 (rated current) (Inverter power＞55kW)	Motor paramet er	◎
F2-11	Parameters autotuning	0: No action 1: Static autotuning 2: Rotation autotuning	0	◎
F3 Group: Vector Control Parameters				
F3-00	Speed loop proportional gain 1	1 ~ 100	30	○
F3-01	Speed loop integration time 1	0.01s ~ 10.00s	0.50s	○
F3-02	Low switching frequency	0.00 ~ F3-05	5.00Hz	○
F3-03	Speed loop proportional gain 2	1 ~ 100	20	○
F3-04	Speed loop integration time 2	0.01s ~ 10.00s	1.00s	○
F3-05	High switching frequency	F3-02 ~ F0-10 (max. frequency)	10.00Hz	○
F3-06	Vector control slip compensation coefficient	50% ~ 200%	100%	○
F3-07	Speed loop filter time	0.000s ~ 0.100s	0.000s	○
F3-08	Vector control over excitation gain	0 ~ 200	64	○
F3-09	Torque upper limit source selection in speed control mode	0: F3-10 1: VI 2: CI 3: Reserved 4: Reserved 5: Communication 6: Min (VI, CI)	0	○

Function code	Name	Detailed instruction	Factory default	Modify
		7: Max (VI, CI) Full scale of 1-7 selection corresponds to F3-10		
F3-10	Torque upper limit digital setting	0.0% ~ 200.0%	150.0%	○
F3-11	Reserved			○
F3-12	Reserved			○
F3-13	Excitation regulation proportional gain	0~60000	2000	○
F3-14	Excitation regulation integral gain	0~60000	1300	○
F3-15	Torque regulation proportional gain	0~60000	2000	○
F3-16	Torque regulation integral gain	0~60000	1300	○
F3-17	Speed loop integral property	Integral separation 0: Invalid 1: Valid	0	○
F4 Group: V/f Control Parameters				
F4-00	V/f curve setting	0: Linear 1: Multiple-points 2: Square 3: 1.2th power 4: 1.4th power 6: 1.6th power 8: 1.8th power 9: Reserved 10: V/f separate completely 11: V/f separate partially	0	◎
F4-01	Torque boost	0.0: auto 0.1% ~ 30.0%	Model depend	○
F4-02	Torque boost cutoff frequency	0.00Hz ~ F0-10 (max. frequency)	50.00Hz	◎
F4-03	V/f frequency point 1	0.00Hz ~ F4-05	0.00Hz	◎
F4-04	V/f voltage point 1	0.0% ~ 100.0%	0.0%	◎
F4-05	V/f frequency point 2	F4-03 ~ F4-07	0.00Hz	◎
F4-06	V/f voltage point 2	0.0% ~ 100.0%	0.0%	◎
F4-07	V/f frequency point 3	F4-05 ~ F2-04 (motor rated frequency)	0.00Hz	◎
F4-08	V/f voltage point 3	0.0% ~ 100.0%	0.0%	◎

Function code	Name	Detailed instruction	Factory default	Modify
F4-09	V/f slip compensation gain	0.0% ~ 200.0%	0.0%	○
F4-10	V/f over excitation gain	0 ~ 200	64	○
F4-11	V/f oscillation suppression gain	0 ~ 100	Model depend	○
F4-12	Reserved			
F4-13	Voltage source of V/f separation	0: Digital setting (F4-14) 1: VI 2: CI 3: Reserved 4: Reserved 5: Multi-step speed 6: Simple PLC 7: PID 8: Communication Note: 100% corresponds to motor rated voltage	0	○
F4-14	Digital setting of V/f separation	0V~F2-02 (Motor rated voltage)	0V	○
F4-15	Voltage rise up time of V/f separation	0.0s~1000.0s Note: means voltage rise up time from 0 to motor rated voltage	0.0s	○
F5 Group: Input Terminals				
F5-00	MI1 terminal function	0: No function 1: Forward (FWD) 2: Reverse (REV) 3: Three-line running control 4: Forward Jog (FJOG) 5: Reverse Jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Coast to stop 9: Fault reset (RESET) 10: Pause running 11: External fault (normal open) input 12: Multi-step speed terminal 1 13: Multi-step speed terminal 2 14: Multi-step speed terminal 3 15: Multi-step speed terminal 4 16: ACC/DEC selection terminal 1 17: ACC/DEC selection terminal 2	1	◎
F5-01	MI2 terminal function		2	◎
F5-02	MI3 terminal function		0	◎
F5-03	MI4 terminal function		0	◎
F5-04	MI5 terminal function		0	◎

Function code	Name	Detailed instruction	Factory default	Modify
		18: Main frequency source switching 19: UP and DOWN setting clear (terminal and keypad) 20: Running command switching terminal 21: ACC/DEC invalid 22: PID Pause 23: PLC status reset 24: Wobble frequency pause 25: Counter input 26: Counter reset 27: Length count input 28: Length reset 29: Torque control invalid 30~31: Reserved 32: DC braking command 33: External fault (normal closed) input 34: Frequency modification enabled 35: PID action direction reverse 36: External stop terminal 1 37: Control command switching terminal 2 38: PID integration stop 39: Switch frequency source A to preset frequency 40: Switch frequency source B to preset frequency 41~42: Reserved 43: PID parameter switching 44~45: Reserved 46: Speed control / torque control switching 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: The running time reset		
F5-05 ~ F5-09	Reserved			
F5-10	MI terminals filter time	0.000s ~ 1.000s	0.010s	○
F5-11	Terminal command mode	0: Two-line mode 1	0	◎

Function code	Name	Detailed instruction	Factory default	Modify
		1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2		
F5-12	UP/DOWN change rate	0.001Hz/s ~ 65.535Hz/s	1.00Hz/s	○
F5-13	VI minimum input	0.00V ~ 10.00V	0.00V	○
F5-14	VI minimum input corresponding setting	-100.0% ~ +100.0%	0.0%	○
F5-15	VI maximum input	0.00 ~ 10.00V	10.00V	○
F5-16	VI maximum input corresponding setting	-100.0% ~ +100.0%	100.0%	○
F5-17	VI input filter time	0.00s ~ 10.00s	0.10s	○
F5-18	CI minimum input	0.00V ~ 10.00V	0.00V	○
F5-19	CI minimum input corresponding setting	-100.0% ~ +100.0%	0.0%	○
F5-20	CI maximum input	0.00~ 10.00V	10.00V	○
F5-21	CI maximum input corresponding setting	-100.0% ~ +100.0%	100.0%	○
F5-22	CI input filter time	0.00s ~ 10.00s	0.10s	○
F5-23 ~ F5-56	Reserved			
F5-57	MI1 delay time	0.0s ~ 3600.0s	0.0s	◎
F5-58	MI2 delay time	0.0s ~ 3600.0s	0.0s	◎
F5-59	MI3 delay time	0.0s ~ 3600.0s	0.0s	◎
F5-60	MI terminals valid mode selection	0: Active-high level signal 1: Active-low level signal Units place: MI1 Tens place: MI2 Hundreds place: MI3 Thousands place: MI4 Ten thousands place: MI5	00000	◎
F5-61	Reserved			
F6 Group: Output Terminal				
F6-00	Reserved			
F6-01	MO1 output function selection (open collector output)	0: No output 1: Inverter is running 2: Fault output (fault stop)	0	○

Function code	Name	Detailed instruction	Factory default	Modify
F6-02	Relay 1 output selection (TA, TB, TC)	3: FDT1 output 4: Frequency arrival 5: Zero-speed running (no output when stop) 6: Motor overload pre-alarm 7: Inverter overload pre-alarm 8: Setting count value arrival 9: Designated count value arrival 10: Length arrival 11: Simple PLC circulate running completed 12: Accumulated running time arrival 13: Frequency limiting 14: Torque limiting 15: Ready for running 16: VI>CI 17: Frequency upper limit arrival 18: Frequency lower limit arrival 19: Under voltage status output 20: Communication setting 21: Position fixed (reserved) 22: Position approach (reserved) 23: Zero-speed running 2 (output when stop) 24: Accumulated power-on time arrival 25: FDT2 output 26: Frequency 1 arrival output 27: Frequency 2 arrival output 28: Current 1 arrival output 29: Current 2 arrival output 30: Timing arrival output 31: VI input over limit 32: Off load 33: Reverse running 34: Zero-current status 35: Module temperature arrival 36: Output current over limit 37: Lower limit frequency arrival (output when stop) 38: Warning output (keep running) 39: Motor over temperature pre-alarm 40: This running time arrival	2	○
F6-03	Reserved		0	
F6-04	MO1 output function selection (open collector output)		0	○
F6-05	Relay 2 output selection (TA1, TB1)		0	○

Function code	Name	Detailed instruction	Factory default	Modify
F6-06	Reserved	0: Running frequency 1: Setting frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Reserved 7: VI 8: CI 9: Reserved 10: Length 11: Count value 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0A) 15: Output voltage (100.0% corresponds to 1000.0V) 16: Reserved		
F6-07	AM output function selection		0	○
F6-08	FM output function selection		1	○
F6-09	Reserved			
F6-10	AM offset coefficient	-100.0% ~ +100.0%	0.0%	○
F6-11	AM gain	-10.00 ~ +10.00	1.00	○
F6-12	FM offset coefficient	-100.0% ~ +100.0%	0.0%	○
F6-13	FM gain	-10.00 ~ +10.00	1.00	○
F6-14 ~ F6-17	Reserved			
F6-18	Relay 1 output delay time	0.0s ~ 3600.0s	0.0s	○
F6-19	Relay 2 output delay time	0.0s ~ 3600.0s	0.0s	○
F6-20	MO1 output delay time	0.0s ~ 3600.0s	0.0s	○
F6-21	MO2 output delay time	0.0s ~ 3600.0s	0.0s	○
F6-22	Output terminal valid status selection	0: Positive logic 1: Negative logic Units place: MO1 Tens place: Relay 1 Hundreds place: Relay 2 Thousands place: MO2 Ten thousands place: Reserved	00000	○

Function code	Name	Detailed instruction	Factory default	Modify
F7 Group: Keypad and Display				
F7-00	User password	0 ~ 65535	0	○
F7-01	REV/JOG function selection	0: Invalid 1: Switching between keypad command and remote command (terminal command or communication command) 2: FDW/REV Switching 3: Forward Jog 4: Reverse Jog	0	◎
F7-02	STOP/RESET function selection	0: Valid when keypad control 1: Always valid	1	○
F7-03	Running status display 1	0000 ~ FFFF Bit00: Running frequency 1 (Hz) Bit01: Setting frequency (Hz) Bit02: DC Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (%) Bit07: MI input status Bit08: MO output status Bit09: VI voltage (V) Bit10: CI voltage (V) Bit11: Reserved Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	001F	○
F7-04	Running status display 2	0000 ~ FFFF Bit00: PID feedback Bit01: PLC step Bit02: Reserved Bit03: Running frequency 2 (Hz) Bit04: Remain running time Bit05: VI voltage before calibration (V) Bit06: CI voltage before calibration (V) Bit07: Reserved Bit08: Linear speed Bit09: Current power-on time (Hour) Bit10: Current running time (Min) Bit11: Reserved	0000	○

Function code	Name	Detailed instruction	Factory default	Modify
		Bit12: Communication setting value Bit13: Reserved Bit14: Main frequency A display (Hz) Bit15: Auxiliary frequency B display (Hz)		
F7-05	Stop status display	0000 ~ FFFF Bit00: Setting frequency (Hz) Bit01: DC Bus voltage (V) Bit02: MI input status Bit03: MO output status Bit04: VI voltage(V) Bit05: CI voltage(V) Bit06: Reserved Bit07: Count value Bit08: Length value Bit09: PLC step Bit10: Load speed Bit11: PID setting Bit12: Reserved	0033	○
F7-06	Load speed display coefficient	0.0001 ~ 6.5000	1.0000	○
F7-07	IGBT module temperature	0.0℃~ 100.0℃	-	●
F7-08	The second LED display values	00: Running frequency 1 (Hz) 01: Setting frequency (Hz) 02: DC Bus voltage (V) 03: Output voltage (V) 04: Output current (A) 05: Output power (kW) 06: Output torque (%) 07: MI input status 08: MO output status 09: VI voltage (V) 10: CI voltage (V) 11: Inverter temperature 12: Count value 13: Length value 14: Load speed display 15: PID setting 16: PLC feedback 17: PID step 19: Communication setting frequency 19: Main frequency A display (Hz)	04	○

Function code	Name	Detailed instruction	Factory default	Modify
		20: Auxiliary frequency B display (Hz) 21: Current power-on time (Hour) 22: Current running time (Min) 23: Accumulated running time 24: Remain running time		
F7-09	Accumulated running time	0h ~ 65535h	-	●
F7-10	Model No.	-	-	●
F7-11	Software version No.	-	-	●
F7-12	Load speed display decimal place	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1	○
F7-13	Accumulated Power-on time	0h ~ 65535h	-	●
F7-14	Accumulated power consumption	0kW ~ 65535 kW	-	●
F7-15	Function codes modification attribute	0: Disable 1: Enable	0	○
F8 Group: Enhanced Function				
F8-00	Jog running frequency	0.00Hz ~ F0-10 (max. frequency)	2.00Hz	○
F8-01	Jog acceleration time	0.1s ~ 6500.0s	20.0s	○
F8-02	Jog deceleration time	0.1s ~ 6500.0s	20.0s	○
F8-03	Acceleration time 2	0.1s ~ 6500.0s	Model depend	○
F8-04	Deceleration time 2	0.1s ~ 6500.0s	Model depend	○
F8-05	Acceleration time 3	0.1s ~ 6500.0s	Model depend	○
F8-06	Deceleration time 3	0.1s ~ 6500.0s	Model depend	○
F8-07	Acceleration time 4	0.1s ~ 6500.0s	Model depend	○
F8-08	Deceleration time 4	0.1s ~ 6500.0s	Model depend	○
F8-09	Jump frequency 1	0.00Hz ~ F0-10 (maximum frequency)	0.00Hz	○
F8-10	Jump frequency 2	0.00Hz ~ F0-10 (maximum frequency)	0.00Hz	○

Function code	Name	Detailed instruction	Factory default	Modify
F8-11	Jump frequency amplitude	0.00Hz ~ F0-10 (maximum frequency)	0.01Hz	○
F8-12	FWD/REV dead time	0.0s ~ 3000.0s	0.0s	○
F8-13	Reverse control	0: Enable 1: Disable	0	○
F8-14	Action when setting frequency lower than frequency lower limit	0: Running at frequency lower limit 1: Stop 2: Zero-speed running	0	○
F8-15	Droop control	0.00Hz ~ 10.00Hz	0.00Hz	○
F8-16	Accumulated power-on arrival time	0h ~ 65000h	0h	○
F8-17	Accumulated running arrival time	0h ~ 65000h	0h	○
F8-18	Power-on running command valid protection selection	0: No protection 1: Protection	0	○
F8-19	Frequency detection value (FDT1)	0.00Hz ~ F0-10 (maximum frequency)	50.00Hz	○
F8-20	Frequency detection lagging value (FDT1)	0.0% ~ 100.0% (F8-19)	5.0%	○
F8-21	Frequency arrival detection amplitude	0.0% ~ 100.0% (maximum frequency)	0.0%	○
F8-22	Jump frequency control during ACC/DEC	0: Invalid 1: Valid	0	○
F8-25	Acceleration time 1 and acceleration time 2 switching frequency point	0.00Hz ~ F0-10 (maximum frequency)	0.00Hz	○
F8-26	Deceleration time 1 and deceleration time 2 switching frequency point	0.00Hz ~ F0-10 (maximum frequency)	0.00Hz	○
F8-27	Terminal jog priority	0: Invalid 1: Valid	0	○
F8-28	Frequency detection value (FDT2)	0.00Hz ~ F0-10 (maximum frequency)	50.00Hz	○
F8-29	Frequency detection lagging value (FDT2)	0.0% ~ 100.0% (F8-28)	5.0%	○
F8-30	Any arrival frequency detection value 1	0.00Hz ~ F0-10 (maximum frequency)	50.00Hz	○
F8-31	Any arrival frequency detection amplitude 1	0.0% ~ 100.0% (maximum frequency)	0.0%	○

Function code	Name	Detailed instruction	Factory default	Modify
F8-32	Any arrival frequency detection value 2	0.00Hz ~ F0-10 (maximum frequency)	50.00Hz	○
F8-33	Any arrival frequency detection amplitude 2	0.0% ~ 100.0% (maximum frequency)	0.0%	○
F8-34	Zero-current detection level	0.0% ~ 300.0% 100.0% corresponds to motor rated current	5.0%	○
F8-35	Zero-current detection delay time	0.01s ~ 600.00s	0.10s	○
F8-36	Output current over limit value	0.0% (No detection) 0.1% ~ 300.0% (motor rated current)	200.0%	○
F8-37	Output current over limit detection delay time	0.00s ~ 600.00s	0.00s	○
F8-38	Any arrival current 1	0.0% ~ 300.0% (motor rated current)	100.0%	○
F8-39	Any arrival current 1 amplitude	0.0% ~ 300.0% (motor rated current)	0.0%	○
F8-40	Any arrival current 2	0.0% ~ 300.0% (motor rated current)	100.0%	○
F8-41	Any arrival current 2 amplitude	0.0% ~ 300.0% (motor rated current)	0.0%	○
F8-42	Timing function selection	0: Invalid 1: Valid	0	○
F8-43	Timing running duration source selection	0:F8-44 1:VI 2:CI 3:Reserved Analog input scale corresponds to F8-44	0	○
F8-44	Timing running duration	0.0Min ~ 6500.0Min	0.0Min	○
F8-45	VI input voltage protection lower limit	0.00V ~ F8-46	3.10V	○
F8-46	VI input voltage protection upper limit	F8-45 ~ 10.00V	6.80V	○
F8-47	Module temperature arrival	0℃ ~ 100℃	75℃	○
F8-48	Reserved			
F8-49	Wake up frequency	F8-51 (Dormancy frequency) ~ F0-10 (max. frequency)	0.00Hz	○
F8-50	Wake up delay time	0.0s ~ 6500.0s	0.0s	○
F8-51	Dormancy frequency	0.00Hz ~ F8-49 (Wake up frequency)	0.00Hz	○

Function code	Name	Detailed instruction	Factory default	Modify
F8-52	Dormancy delay time	0.0s ~ 6500.0s	0.0s	○
F8-53	Running arrival time setting	0.0Min ~ 6500.0Min	0.0Min	○
F9 Group: PID Function				
F9-00	PID given source	0: F9-01 1: VI 2: CI 3: Reserved 4: Reserved 5: Communication 6: Multi-step command	0	○
F9-01	PID given through keypad	0.0%~100%	50.0%	○
F9-02	PID feedback source	0: VI 1: CI 2: Reserved 3: Reserved 4: Reserved 5: Communication 6: VI+CI 7: MAX (|VI|, |CI|) 8: MIN (|VI|, |CI|)	0	○
F9-03	PID action direction	0: Positive 1: Negative	0	○
F9-04	PID given feedback range	0~65535	1000	○
F9-05	Proportional gain Kp1	0.0 ~ 100.0	20.0	○
F9-06	Integration time Ti1	0.01s ~ 10.00s	2.00s	○
F9-07	Differential time Td1	0.000s ~ 10.000s	0.000s	○
F9-08	Cutoff frequency of PID reverse	0.00 ~ F0-10 (maximum frequency)	0.00Hz	○
F9-09	PID deviation limit	0.0% ~ 100.0%	0.0%	○
F9-10	PID differential amplitude	0.00% ~ 100.00%	0.10%	○
F9-11	PID given filter time	0.00 ~ 650.00s	0.00s	○
F9-12	PID feedback filter time	0.00 ~ 60.00s	0.00s	○
F9-13	PID output filter time	0.00 ~ 60.00s	0.00s	○

Function code	Name	Detailed instruction	Factory default	Modify
F9-14	Reserved			
F9-15	Proportional gain Kp2	0.0 ~ 100.0	20.0	○
F9-16	Integration time Ti2	0.01s ~ 10.00s	2.00s	○
F9-17	Differential time Td2	0.000s ~ 10.000s	0.000s	○
F9-18	PID parameter switching condition	0: No switching 1: Switching via MIn terminals 2: Automatic switching according to the deviation	0	○
F9-19	PID parameter switching deviation 1	0.0% ~F9-20	20.0%	○
F9-20	PID parameter switching deviation 2	F9-19 ~ 100.0%	80.0%	○
F9-21	PID initial value	0.0% ~ 100.0%	0.0%	○
F9-22	PID initial value holding time	0.00 ~ 650.00s	0.00s	○
F9-23	Forward maximum value between two output deviation	0.00% ~ 100.00%	1.00%	○
F9-24	Reverse maximum value between two output deviation	0.00% ~ 100.00%	1.00%	○
F9-25	PID integration attribute	Units place: Integration separate 0: Invalid 1: Valid Tens place: Stop integrating or not after output reach limit 0: Keep integrating 1: Stop integrating	00	○
F9-26	PID feedback lost detection value	0.0%: No judgment for feedback lost 0.1% ~ 100.0%	0.0%	○
F9-27	PID feedback lost detection time	0.0s ~ 20.0s	0.0s	○
F9-28	PID stop calculation	0: No calculation when stop 1: Calculation when stop	1	○
FA Group: Fault and Protection				
FA-00	Motor overload protection selection	0: Disable 1: Enable	1	○
FA-01	Motor overload protection gain	0.20 ~ 10.00	1.00	○

Function code	Name	Detailed instruction	Factory default	Modify
FA-02	Motor overload pre-alarm coefficient	50% ~ 100%	80%	○
FA-03	Stall over-voltage gain	0 ~ 100	Model depend	○
FA-04	Stall over-voltage point / Braking threshold	120% ~ 150%	135%	○
FA-05	Stall over current gain	0 ~ 100	30	○
FA-06	Stall over-current point	100% ~ 200%	170%	○
FA-07	Short-circuit to ground protection selection when power-on	0: Invalid 1: Valid	1	○
FA-08	Reserved			
FA-09	Fault auto-reset times	0 ~ 20	0	○
FA-10	MO output selection during fault auto-reset	0: No action 1: Action	0	○
FA-11	Fault auto-reset interval	0.1s ~ 100.0s	1.0s	○
FA-12	Reserved			
FA-13	Output phase failure protection selection	0: Disable 1: Enable	1	○
FA-14	The first fault type	0: No fault 1: Reserved 2: Acc over current 3: Dec over current 4: Over current in constant speed 5: Over voltage in Acc process 6: Over voltage in Dec process 7: Over voltage in constant speed 8: Buffer resistor overload 9: Under voltage 10: Inverter overload 11: Motor overload 12: Input side phase failure 13: Output side phase failure 14: IGBT Module overheat 15: External fault 16: Communication fault 17: Contactor fault 1 8: Current detection fault 19: Motor autotuning fault	—	●
FA-15	The second fault type		—	●
FA-16	The third (latest) fault type		—	●

Function code	Name	Detailed instruction	Factory default	Modify
		20: Reserved 21: Parameter R/W fault 2 2: Inverter hardware fault 23: Motor short circuit to ground fault 24: Reserved 25: Reserved 26: Running time arrival 27: Reserved 28: Reserved 29: Power-on time arrival 30: Off load 31: PID feedback lost when running 40: Fast current limiting over time 41: Switch the motor during running 42 ~ 51: Reserved		
FA-17	Frequency at the third (latest) fault	—	—	●
FA-18	Current at the third (latest) fault	—	—	●
FA-19	Bus voltage at the third (latest) fault	—	—	●
FA-20	Input terminal's status at the third (latest) fault	—	—	●
FA-21	Output terminal's status at the third (latest) fault	—	—	●
FA-22	Inverter status at the third (latest) fault	—	—	●
FA-23	Power-on time at the third (latest) fault	—	—	●
FA-24	Running time at the third (latest) fault	—	—	●
FA -25 ~ FA-26	Reserved			
FA-27	Frequency at the second fault	—	—	●
FA-28	Current at the second fault	—	—	●
FA-29	Bus voltage at the second fault	—	—	●
FA-30	Input terminal's status at the second fault	—	—	●
FA-31	Output terminal's status	—	—	●

Function code	Name	Detailed instruction	Factory default	Modify
	at the second fault			
FA-32	Inverter status at the second fault	—	—	●
FA-33	Power-on time at the second fault	—	—	●
FA-34	Running time at the second fault	—	—	●
FA -35 ~ FA-36	Reserved			
FA-37	Frequency at the first fault	—	—	●
FA-38	Current at the first fault	—	—	●
FA-39	DC bus voltage at the first fault	—	—	●
FA-40	Input terminal's status at the first fault	—	—	●
FA-41	Output terminal's status at the first fault	—	—	●
FA-42	Inverter status at the first fault	—	—	●
FA-43	Power-on time at the first fault	—	—	●
FA-44	Running time at the first fault	—	—	●
FA-45 ~ FA-58	Reserved			
FA-59	Instantaneous power-off action selection	0: Invalid 1: Deceleration 2: Deceleration-to-stop	0	○
FA-60	Reserved			
FA-61	Recover judgment time when Instantaneous power-off	0.00s ~ 100.00s	0.50s	○
FA-62	Recover judgment voltage when Instantaneous power-off	60 ~ 100.0%	80.0%	○
FA-63	Off-load protection selection	0: Disable 1: Enable	0	○
FA-64	Off-load detection level	0.0 ~ 100.0%	10.0%	○
FA-65	Off-load detection time	0.0 ~ 60.0s	1.0s	○

Function code	Name	Detailed instruction	Factory default	Modify
FA-66 ~ FA-70	Reserved			
FB Group: Wobble Frequency, Fixed Length, Counting				
FB-00	Wobble frequency setting mode	0: Relative to center frequency 1: Relative to maximum frequency	0	○
FB-01	Wobble frequency amplitude	0.0% ~ 100.0%	0.0%	○
FB-02	Sudden Jump frequency amplitude	0.0% ~ 50.0%	0.0%	○
FB-03	Wobble frequency cycle	0.1s ~ 3000.0s	10.0s	○
FB-04	Triangular wave rise time coefficient	0.1% ~ 100.0%	50.0%	○
FB-05	Setting length	0m ~ 65535m	1000m	○
FB-06	Actual length	0m ~ 65535m	0m	○
FB-07	Number of pulses per meter	0.0 ~ 6553.5	100.0	○
FB-08	Setting count value	1 ~ 65535	1000	○
FB-09	Designated count value	1 ~ 65535	1000	○
FC Group: Communication Parameters				
FC-00	Baud rate	Unit place: Modbus 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS Tens place: Reserved Hundred place: Reserved Thousand place: Reserved	6005	○
FC-01	Data format	0: No parity check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No parity check (8-N-1)	0	○
FC-02	Inverter address	1 ~ 249, 0 is broadcast address	1	○

Function code	Name	Detailed instruction	Factory default	Modify
FC-03	Communication delay time	0ms ~ 20ms	2ms	○
FC-04	Communication timeout time	0.0 (invalid) 0.1s ~ 60.0s	0.0	○
FC-05	Communication protocol selection	Unit place: Modbus 0: Non-standard MODBUS protocol 1: Standard MODBUS protocol Tens place: Reserved	31	○
FC-06	Communication read current resolution	0: 0.01A 1: 0.1A	0	○
FD Group: Multi-step Command and Simple PLC				
FD-00	Multi-step speed 0	-100.0% ~ 100.0%	0.0%	○
FD-01	Multi-step speed 1	-100.0% ~ 100.0%	0.0%	○
FD-02	Multi-step speed 2	-100.0% ~ 100.0%	0.0%	○
FD-03	Multi-step speed 3	-100.0% ~ 100.0%	0.0%	○
FD-04	Multi-step speed 4	-100.0% ~ 100.0%	0.0%	○
FD-05	Multi-step speed 5	-100.0% ~ 100.0%	0.0%	○
FD-06	Multi-step speed 6	-100.0% ~ 100.0%	0.0%	○
FD-07	Multi-step speed 7	-100.0% ~ 100.0%	0.0%	○
FD-08	Multi-step speed 8	-100.0% ~ 100.0%	0.0%	○
FD-09	Multi-step speed 9	-100.0% ~ 100.0%	0.0%	○
FD-10	Multi-step speed 10	-100.0% ~ 100.0%	0.0%	○
FD-11	Multi-step speed 11	-100.0% ~ 100.0%	0.0%	○
FD-12	Multi-step speed 12	-100.0% ~ 100.0%	0.0%	○
FD-13	Multi-step speed 13	-100.0% ~ 100.0%	0.0%	○
FD-14	Multi-step speed 14	-100.0% ~ 100.0%	0.0%	○
FD-15	Multi-step speed 15	-100.0% ~ 100.0%	0.0%	○
FD-16	Simple PLC running mode	0: Stop after one cycle 1: Keep last frequency after one cycle 2: Circular running	0	○
FD-17	Simple PLC status memory selection	Units place: Memory selection when power-off	00	○

Function code	Name	Detailed instruction	Factory default	Modify
		0: Not memory 1: Memory Tens place: Memory selection when stop 0: Not memory 1: Memory		
FD-18	0th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-19	0th step ACC/DEC time selection	0 ~ 3	0	○
FD-20	1st step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-21	1st step ACC/DEC time selection	0 ~ 3	0	○
FD-22	2nd step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-23	2nd step ACC/DEC time selection	0 ~ 3	0	○
FD-24	3rd step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-25	3rd step ACC/DEC time selection	0 ~ 3	0	○
FD-26	4th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-27	4th step ACC/DEC time selection	0 ~ 3	0	○
FD-28	5th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-29	5th step ACC/DEC time selection	0 ~ 3	0	○
FD-30	6th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-31	6th step ACC/DEC time selection	0 ~ 3	0	○
FD-32	7th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-33	7th step ACC/DEC time selection	0 ~ 3	0	○
FD-34	8th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-35	8th step ACC/DEC time selection	0 ~ 3	0	○
FD-36	9th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-37	9th step ACC/DEC time selection	0 ~ 3	0	○

Function code	Name	Detailed instruction	Factory default	Modify
FD-38	10th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-39	10th step ACC/DEC time selection	0 ~ 3	0	○
FD-40	11th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-41	11th step ACC/DEC time selection	0 ~ 3	0	○
FD-42	12th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-43	12th step ACC/DEC time selection	0 ~ 3	0	○
FD-44	13th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-45	13th step ACC/DEC time selection	0 ~ 3	0	○
FD-46	14th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-47	14th step ACC/DEC time selection	0 ~ 3	0	○
FD-48	15th step running time	0.0s (h) ~ 6500.0s (h)	0.0s (h)	○
FD-49	15th step ACC/DEC time selection	0 ~ 3	0	○
FD-50	Timing unit (Simple PLC mode)	0: s (second) 1: h (hour)	0	○
FD-51	Multi-step speed 0 given channel	0: FD-00 1: VI 2: CI 3: Keypad potentiometer 4: Reserved 5: PID control 6: Keypad setting frequency (F0-08), can be modified via UP/DN	0	○
FE Group: Torque Control & Optimized Parameters				
FE-00	Speed/torque control mode selection	0: Speed control 1: Torque control	0	◎
FE-01	Torque setting source selection in torque control mode	0: Reserved 1: VI 2: CI 3: Reserved 4: Reserved 5: Communication 6: Min (VI, CI) 7: Max (VI, CI)	0	◎

Function code	Name	Detailed instruction	Factory default	Modify
FE-02	Reserved			
FE-03	Torque setting through keypad in torque control mode	-200.0% ~ 200.0%	150.0%	○
FE-04	0Hz PWM output control mode	0: Invalid 1: Valid	0	○
FE-05	Forward maximum frequency in torque control mode	0.00Hz ~ F0-10 (maximum frequency)	50.00Hz	○
FE-06	Reverse maximum frequency in torque control mode	0.00Hz ~ F0-10 (maximum frequency)	50.00Hz	○
FE-07	ACC time in torque control mode	0.00s ~ 65000s	0.00s	○
FE-08	DEC time in torque control mode	0.00s ~ 65000s	0.00s	○
FE-09	DPWM switching upper limit frequency	0.00Hz ~ 15.00Hz	12.00Hz	○
FE-10	PWM regulation mode	0: Asynchronous mode 1: Synchronous mode	0	○
FE-11	Dead zone compensation mode selection	0: no compensation 1: compensation mode 1 2: compensation mode 2	1	○
FE-12	Depth of random PWM	0: Random PWM invalid 1~10: depth of random PWM	0	○
FE-13	Fast current limitation enable	0: Disable 1: Enable	1	○
FE-14	Current detection compensation	0~100	5	○
FE-15	SVC optimized mode selection	0: No optimized 1: Optimized mode 1 2: Optimized mode 2	1	○
FE-16	Under voltage level setting	60% ~ 140%	80%	○

5.2 Monitoring Parameter Table (U0 group)

Function code	Name	Minimum unit
U0-00	Running frequency (Hz)	0.01Hz
U0-01	Setting frequency (Hz)	0.01Hz
U0-02	DC bus voltage (V)	0.1V
U0-03	Output voltage (V)	1V
U0-04	Output current (A)	0.01A
U0-05	Output power (kW)	0.1kW
U0-06	Output torque (%)	0.1%
U0-07	MI input status	1
U0-08	MO output status	1
U0-09	VI voltage (V)	0.01V
U0-10	CI voltage (V)	0.01V
U0-11	Reserved	1℃
U0-12	Count value	1
U0-13	Length value	1
U0-14	Load speed	1
U0-15	PID setting	1
U0-16	PID feedback	1
U0-17	PLC step	1
U0-18	Reserved	0.01kHz
U0-19	Feedback speed (unit 0.1Hz)	0.1Hz
U0-20	Remain running time	0.1Min
U0-21	VI voltage before calibration	0.001V
U0-22	CI voltage before calibration	0.001V
U0-23	Reserved	0.001V
U0-24	linear speed	1m/Min
U0-25	Current power-on time	1Min
U0-26	Current running time	0.1Min
U0-27	Reserved	1Hz
U0-28	Communication setting value	0.01%
U0-29	Reserved	0.01Hz
U0-30	Main frequency A display	0.01Hz
U0-31	Auxiliary frequency B display	0.01Hz

Chapter 6 Parameter Description

Group F0 Basic Function

F0-00 **Name**: Inverter model **Default setting**: 1

Setting range:

1: G model

2: P model

Note: this parameter cannot be modified, it just for customer to check the inverter model.

1: G model: Applicable to constant torque load.

2: P model: Applicable to variable torque load (like fans and pumps etc.)

F0-01 **Name**: control mode **Default setting**: 2

Setting range:

0: Sensorless Vector Control (SVC)

1: Reserved

2: V/F control

Control mode selection:

0: Sensorless vector control (SVC)

It is widely used for the application which requires high torque at low speed, high speed accuracy, and quicker dynamic response, such as machine tool, injection molding machine, centrifugal machine and wire-drawing machine, etc.

1: Reserved

2: V/F control

It is suitable for general purpose application such as pumps, fans etc. One inverter can drive multiple motors.

Notice:

The autotuning of motor parameters must be accomplished properly if you use the sensorless vector control.

In order to achieve better control characteristic, the parameters of vector control (F3 Group) should be adjusted.

F0-02 **Name**: Running command source **Default setting**: 0

Setting range:

0: Keypad (LED OFF)

1: Terminal (LED ON)

2: Communication (LED flickers)

Select the input channel for control command. The inverter control commands include start, stop, forward run, reverse run, Jog and so on.

0: Keypad (“LOCAL/REMOT” LED OFF)

Both RUN and STOP/RST keys are used for running command control. If multifunction key QUICK/JOG is set as FWD/REV switching function (F7-01 is set to be 2), it will be used to change the rotating orientation. If multifunction key QUICK/JOG is set as FWD jog (F7-01 is set to be 3) or REV jog (F7-01 is set to be 4), it will be used for jog running.

1: Terminal (“LOCAL/REMOT” LED ON)

The operations, including FWD, REV, JOGF, JOGR, etc. can be controlled by multifunctional input terminals.

2: Communication (“LOCAL/REMOT” LED flickers)

The operation of inverter can be controlled by host through communication.

F0-03 **Name**: Main frequency source A selection **Default setting**: 0

Setting range:

0: Keypad

(F0-08, UP and DOWN Adjustable, non-recorded after power off)

1: Keypad potentiometer

2: VI (0~10V)

3: CI (4~20mA)

4: Reserved

5: Reserved

6: Multi-step speed

7: Simple PLC

8: PID

9: Communication (Modbus)

To selection main frequency source A channel

0: Keypad

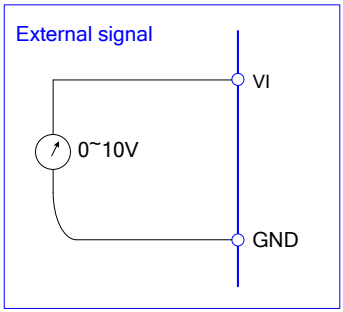
The initial value is the value of F0-08. The setting frequency value of inverter can be modified through the keys “▲” and “▼” of the keyboard (or UP and DOWN of multifunctional input terminals).

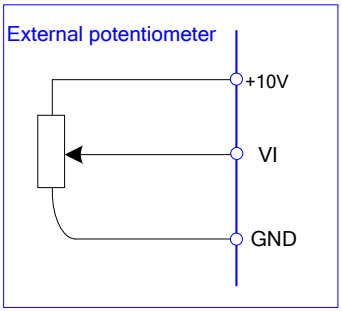
“Not store” means that the setting frequency is recovered to the value of F0-08 in case of inverter power- off.

1: Keypad potentiometer

When select the keypad potentiometer to be the frequency source, the output frequency can be adjusted by the potentiometer.

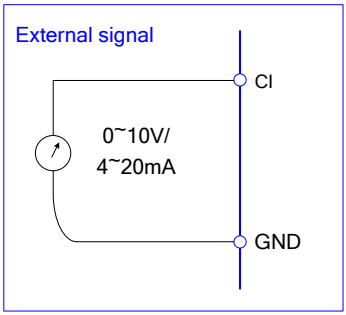
2: VI (0~10V)





3: CI (4~20mA)

The reference frequency is set by analog input. KD series inverter provides 2 analog input terminals (VI & CI). VI is special for voltage input signal of 0~10V, CI is special for current input signal of 4~20mA.



4: Reserved

5: Reserved

6: Multi-step speed

While select multi-step speed function, it needs to use the MI input terminals' input status (0 and 1) to get different combinations, it corresponds to different frequency setting. KD series inverter can set 4 multi-step speed terminals; they have 16 different combinations, which correspond to 16 frequency settings in FC group.

7: Simple PLC

User can set reference frequency, running time, running direction of each step and acceleration/deceleration time between steps. For details, please refer to description of FD group.

8: PID

The reference frequency is the result of PID adjustment. For details, please refer to description of F9 group.

9: Communication

The reference frequency is set through RS485. For details, please refer to Modbus protocol in Chapter 9.

F0-04 **Name**: Auxiliary frequency source B selection **Default setting**: 0

Setting range:

0: Keypad

(F0-08, UP and DOWN Adjustable, non-recorded after power off)

1: Keypad potentiometer

2: VI (0~10V)

3: CI (0~10V / 4~20mA)

4: Reserved

5: Reserved

6: Multi-step speed

7: Simple PLC

8: PID

9: Communication (Modbus)

When the auxiliary frequency source is used as independent frequency reference channel (i.e. frequency source switching from A to B), it is used in the same way as the main frequency source. Please refer to F0-03.

When the auxiliary frequency source is used as combination reference, please note:

1). If the auxiliary frequency source is keypad reference, the frequency (F0-08) is invalid, and it needs to adjust the main reference frequency through the keys "▲"and "▼" of the keyboard (or UP and DOWN of multifunctional input terminals).

2). If the auxiliary frequency source is analog input reference (VI, CI) or pulse input reference, 100% of input corresponds to the auxiliary frequency source range (refer to F0-05 and F0-06).

Notice: F0-03 and F0-04 can't be set to be the same value. Otherwise, disorder will occur.

F0-05 **Name**: Frequency source B reference **Default setting**: 0

Setting range:

0: Relative to maximum frequency

1: Relative to frequency source A

F0-06 **Name**: Auxiliary Frequency source B range **Default setting**: 100%

Setting range: 0% ~ 150%

When the frequency source selection is frequency combination reference (F0-07 is set to 1,3 or 4), the two parameters are used to determine the adjustment range of auxiliary frequency source.

F0-05 is used to determine the relative object of that range. If it is relative to maximum frequency A, that range will change with the main frequency A.

F0-07 **Name**: Frequency source selection **Default setting**: 00

Setting range:

➢ Units place: frequency source selection

0: Main frequency source A

1: Calculation result of frequency A and B (determined by tens place)

2: Switching between A and B

3: Switching between A and calculation result

4: Switching between B and calculation result

➢ Tens place: calculation relationship between frequency A and B

0: A + B

1: A - B

2: Max (A, B)

3: Min (A, B)

➢ Units place: Frequency source selection

0: Main frequency source A

Reference frequency = A

1: Calculation result of frequency A and B

Reference frequency = Calculation result of frequency A and B (determined by tens place)

2: Switching between A and B

If the multifunctional input terminal (F5-0X=18: frequency switching) is invalid, reference frequency = A.

If the multifunctional input terminal (frequency source switching) is valid, reference frequency = B.

3: Switching between A and calculation result

If the multifunctional input terminal (F5-0X=18: frequency switching) is invalid, reference frequency = A.

If the multifunctional input terminal (F5-0X=18: frequency switching) is valid, reference frequency = calculation result.

4: Switching between B and calculation result

If the multifunctional input terminal (F5-0X=18: frequency switching) is invalid, reference frequency = B.

If the multifunctional input terminal (F5-0X=18: frequency switching) is valid, reference frequency = calculation result.

➢ Tens place: Frequency source main/auxiliary calculation relationship

0: A + B

Reference frequency = A + B, achieving frequency combination given function.

1: A - B

Reference frequency = A - B

2: Max (A, B)

Reference frequency = Max (A, B)

3: Min (A, B)

Reference frequency = Min (A, B)

Note: When the frequency source selection is main/auxiliary calculation, the preset offset frequency can be set via F0-21, which can be added to main/auxiliary calculation result to meet different kinds of demand.

F0-08 **Name**: Keypad reference frequency **Default setting**: 50.00Hz

Setting range: 0.00 ~ F0-10 (maximum frequency)

When the main frequency source is selected as “Keypad” or “Terminals UP/DOWN”, this function code is the initial frequency setting of the inverter.

F0-09 **Name**: Running direction **Default setting**: 0

Setting range:

0: Forward

1: Reverse

Through modifying this function code, it can change the rotary direction of the motor without changing motor wiring. It’s equal to adjust any two lines of the motor (U, V and W) and further change the rotary direction of the motor.

Note: If the parameters are restored, the running direction will be back to its original status.

F0-10 **Name**: Maximum frequency **Default setting**: 50.00Hz

Setting range: 50.00 ~ 600.00Hz

The maximum output frequency of KD series inverter is 3200Hz.

When F0-22 is set to 1, frequency resolution is 0.1Hz; F0-10 setting range is 50.0Hz～3200.0Hz;

When F0-22 is set to 2, frequency resolution is 0.01Hz; F0-10 setting range is 50.0Hz～600.0Hz.

F0-11 **Name**: Frequency source of upper limit **Default setting**: 0

Setting range:

0: F0-12

1: VI

2: CI

3: Reserved

4: Reserved

5: Communication

It is used to define the source of frequency upper limit. The frequency upper limit can be sourced from either digital setting (F0-12) or analog input. When the analog input is used to set the frequency upper limit, 100% of analog input setting is relative to F0-12.

Notice:

Upper frequency limit should exceed than the maximum frequency.

Output frequency should not exceed upper frequency limit.

F0-12 **Name**: Frequency upper limit **Default setting**: 50.00Hz
Setting range: F0-14 (Frequency lower limit) ~ F0-10 (Maximum frequency)

F0-13 **Name**: Frequency upper limit offset **Default setting**: 0.00Hz
Setting range: 0.00Hz ~ F0-10 (Maximum frequency)

When the frequency source upper limit is set as analog input, F0-13 is used as the setting value's offset. The combination of this offset frequency and F0-11 is used as the final setting value of frequency upper limit.

F0-14 **Name**: Frequency lower limit **Default setting**: 0.00Hz
Setting range: 0.00Hz ~ F0-10 (Maximum frequency)

If the reference frequency is lower than frequency lower limit, the inverter can stop, or run with lower limit frequency, or run at zero speed, which is set by F8-14.

F0-15 **Name**: Carrier frequency **Default setting**: Model depend
Setting range: 0.5kHz ~ 16.0kHz

Carrier frequency will affect the noise of motor and the EMI of inverter.
If the carrier frequency is increased, it will cause better current wave, less harmonic current and lower noise of motor.

Notice:
The factory default is optimal in most cases. Modification of this parameter is not recommended.
If the carrier frequency exceeds the factory default, the inverter must be derated because the higher carrier frequency will cause more switching loss, higher temperature rise of inverter and stronger electromagnetic interference.
If the carrier frequency is lower than the factory default, it is possible to cause less output torque of motor and more harmonic current.

The effect of modifying carrier frequency is as following:

Carrier frequency	Low → High
Motor noise	High → Low
Output current waveform	Bad → Good
Motor temperature rise	High → Low
Inverter temperature rise	Low → High
Leakage current	Small → Big
External radiation interference	Small → Big

F0-16 **Name**: Carrier frequency adjusting by temperature **Default setting**: 0

Setting range:

0: No

1: Yes

The inverter can automatically adjust the carrier frequency according to its temperature. If the inverter detect the temperature of radiator is higher, it will reduce the carrier frequency to get lower temperature rising. And while the temperature of radiator is lower, the carrier frequency will rise up to the setting value slowly.

This function can reduce the possibility of overheat alarm of the inverter.

F0-17 **Name**: Acceleration time 1 **Default setting**: Model depend

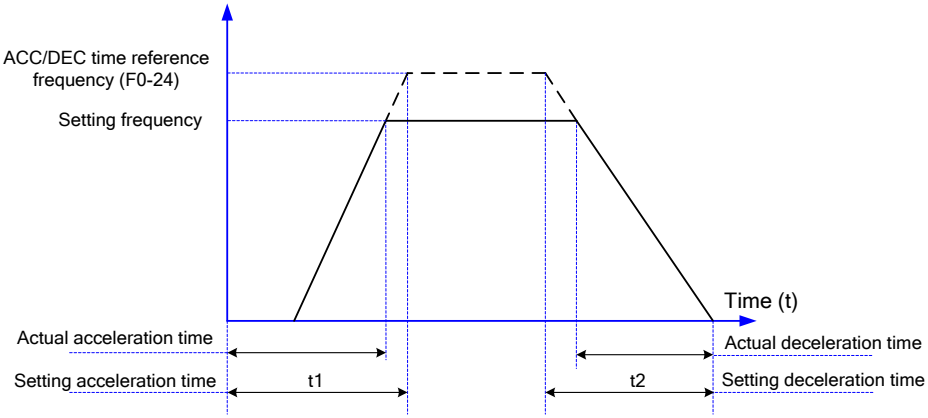
Setting range: 0.00s ~ 65000s

F0-18 **Name**: Deceleration time 1 **Default setting**: Model depend

Setting range: 0.00s ~ 65000s

Acceleration time is the time of inverter accelerates from 0Hz to setting frequency of F0-24. Deceleration time is the time of inverter decelerates setting frequency of F0-24 to 0Hz.

Please refer to following figure.



There are totally four groups of acceleration/deceleration time which can be selected via the multifunctional digital input terminals.

Group 1: F0-17, F0-18;

Group 2: F8-03, F8-04;

Group 3: F8-05, F8-06;

Group 4: F8-07, F8-08.

F0-19 **Name**: ACC/DEC time unit **Default setting**: 1

Setting range:

0: 1s

1: 0.1s

2: 0.01s

KD series inverter offers three ACC/DEC time units; they are 1s, 0.1s, 0.01s.

Notice:

When modifying this function parameter, 4 group ACC/DEC time display decimal place changes, the corresponding ACC/DEC time also changes.

F0-21 **Name**: Auxiliary frequency source offset frequency when combination **Default setting**: 0.00Hz

Setting range: 0.00Hz ~ F0-10 (max. frequency)

This function code is only valid when frequency source is set to be main/auxiliary calculation. When frequency source is set to be main/auxiliary calculation, F0-21 is offset frequency, which can be combined with main/auxiliary calculation result setting as reference frequency.

F0-22 **Name**: Frequency command resolution **Default setting**: 2

Setting range:

1: 0.1Hz

2: 0.01Hz

This parameter is used to determine the resolution of all the function codes related to frequency. When frequency resolution is 0.1Hz, the max. output frequency is 3200.0Hz. When frequency resolution is 0.01Hz, the max. output frequency is 600.00Hz.

Notice:

When modifying this parameter, the decimal place of all the parameters related to frequency changes, the corresponding frequency value changes too.

F0-23 **Name**: Digital setting frequency storage selection when stop **Default setting**: 1

Setting range:

0: Not store

1: store

This function is only valid when frequency source is set by keypad

0: No store means that the keypad setting frequency value would recover to the value of F0-08 (preset frequency) after the inverter stopped. The frequency modification by keys "▲", "▼" or terminal UP / DOWN would be cleared.

1: Store means that the keypad setting frequency would recover to the last frequency when inverter stopping. The frequency modification by keys "▲", "▼" or terminal UP, DOWN is valid.

F0-24 **Name**: ACC/DEC time reference frequency **Default setting**: 0

Setting range:

0: F0-10 (max. frequency)

1: Setting frequency

2: 100Hz

ACC/DEC time means inverter accelerates or decelerates from 0Hz to the set frequency of F0-24,

When F0-24 is set to 1, ACC/DEC time is related to setting frequency. The motor acceleration will be changed if setting frequency changes frequently.

F0-25 **Name**: Running frequency command UP/DOWN reference **Default setting**: 1

Setting range:

0: Running frequency

1: Setting frequency

This parameter is only valid when frequency source is set by keypad.

It is used to confirm which mode would be used to modify setting frequency when keys "▲", "▼" or terminal UP / DOWN acts. That is to say, whether reference frequency increases/decreases on the base of running frequency, or increases/decreases on the basic of setting frequency.

F0-26 **Name**: Command source combination UP/DOWN reference **Default setting**: 000

Setting range:

- Units place: Operation keypad command combination with frequency source

0: No combination

1: Keypad Potentiometer

2: VI

3: CI

4: Reserved

5: Reserved

6: Multi-step speed

7: Simple PLC

8: PID

9: Communication

- Tens place: Terminal command combination with frequency source
- Hundreds place: Communication command combination with frequency source

Defining the combination between three running command channels and nine frequency given channels, it's convenient to achieve synchronous switching.

The meaning of the above frequency given channels is the same as the selection of the main frequency source A (F0-03). Please refer to F0-03.

Different running command channels can bind the same frequency given channel.

When command source binds frequency source & command source is valid, the frequency source set by F0-03 ~ F0-07 is invalid.

F0-27 **Name**: Parameters initialization **Default setting**: 0

Setting range:

0: No action

1: Initialize basic parameters (F0 and F1 groups)

2: Clear the record

3: Initialized completely

1. Initialize basic parameters (F0 and F1 groups).
   After F0-27 is set to 1, parameters in F1 and F2 groups will be initialized.
2. Clear the record information.
   Clear the fault record information, accumulated running time (F7-09), accumulated power on time (F7-13), accumulated power consumption (F7-14).
3. Initialized completely
   After F0-27 is set to 3, parameters are initialized completely.

Group F1 Start and Stop Control

F1-00 **Name**: Start mode **Default setting**: 0

Setting range:

0: Direct start

1: Speed tracking and restart

2: Pre-excitation start

0: Direct start

If DC braking time is set to 0, the inverter will start from the start frequency.

If DC braking time is set to nonzero value, DC braking will be performed firstly, then the inverter starts from the start frequency. It is suitable for the application that the motor maybe running during starting with small inertia load.

1: Speed tracking and restart

Inverter detects the rotation speed and direction of motor, and then starts to run at the detected speed and direction. This can realize smooth start of running motor with big inertia load when instantaneous power-off. To ensure the performance of speed tracking restart, please set motor parameters accurately. (Group F2)

2: pre-excitation start

Only valid for asynchronous motor, used to establish magnetic field before motor running. For pre-excitation current, pre-excitation time, please refer to F1-05, F1-06 description.

If pre-excitation time is set to 0, the inverter will cancel the pre-excitation process, start from the starting frequency. Or the inverter will make the pre-excitation, then start, which can improve the motor dynamic response performance.

F1-01 **Name**: Speed tracking mode **Default setting**: 0

Setting range:

0: Begin from stop frequency

1: Begin from zero speed

2: Begin from maximum frequency

To complete the speed tracking process in the shortest time, select the suitable mode of inverter tracking motor speed:

0: To track from the frequency when stop, normally it adopts this mode.

1: To track from zero-frequency, suitable for the applications that restart after a long time power-off.

2: To track from maximum frequency and suitable for the power generating loads.

F1-02 **Name**: Speed tracking speed **Default setting**: 20

Setting range: 1 ~ 100

It is used to select the speed tracking speed when set the start mode as “speed tracking and restart”.

The bigger this parameter is, the faster the tracking speed is. But too big value may result in unreliable tracking.

F1-03 **Name**: Start frequency **Default setting**: 0.00Hz

Setting range: 0.00Hz ~ 10.00Hz

F1-04 **Name:** Start frequency holding time **Default setting:** 0.0s

Setting range: 0.0s ~ 100.0s

Set proper start frequency can increase the start torque.

If the reference frequency is less than start frequency, inverter will be at stand-by status, and has no output.

The start frequency could be less than the lower frequency limit.

F1-04 takes no effect during FWD/REV switching.

Example 1:

F0-03=0	Frequency source is digital reference
F0-08=2.00Hz	Digital setting frequency is 2.00Hz.
F1-03=5.00Hz	Start frequency is 5.00Hz.
F1-04=2.0s	Start frequency holding time is 2.0s.

At this time, the inverter is at standby status, and the output frequency is 0Hz.

Example 2:

F0-03=0	Frequency source is digital setting.
F0-08=10.00Hz	Digital setting frequency is10.00Hz.
F1-03=5.00Hz	Start frequency is 5.00Hz.
F1-04=2.0s	Start frequency holding time is 2.0s.

At this time, the inverter accelerates to 5Hz, and further to the reference frequency 10Hz in 2s.

F1-05 **Name**: DC braking current before start/ **Default setting**: 0%

Pre-excitation current

Setting range: 0% ~ 100%

F1-06 **Name**: DC braking time before start/ **Default setting**: 0.0s

Pre-excitation time

Setting range: 0.0s ~ 100.0s

DC braking is used to make the running motor stop & restart. Pre-excitation is used to establish

asynchronous motor magnetic field, then start, improve the response speed.

DC braking is only valid when start directly, the inverter performs DC braking according to F1-05 firstly, and runs after F1-06. If DC braking time is 0, the inverter starts directly. The bigger the DC braking current is, the greater the braking force is.

If the start mode is pre-excitation start, then the inverter establishes magnetic field according to the set pre-excitation current firstly, runs after the set pre-excitation time. If the pre-excitation time is 0, the inverter starts directly.

DC braking current before start/pre-excitation current refers to the percentage of the inverter rated current.

F1-07 **Name**: ACC/DEC mode **Default setting**: 0

Setting range:

0: Linear ACC/DEC

1: S-curve ACC/DEC A

2: S-curve ACC/DEC B

This parameter is to select the frequency change mode while start and stop the inverter.

0: Linear ACC/DEC

The output frequency increases or decreases according to the straight line. KD series inverter has 4 kinds of ACC/DEC time, which can be set by F5-00 ~ F5-04 (function set as 16, 17).

1: S-curve ACC/DEC A

The output frequency increases or decreases according to S-curve. S-curve is suitable for applications which require start & stop smoothly, such as elevator and conveyor belt.

2: S curve ACC/DEC B

In the S-curve ACC/DEC B, the motor rated frequency fb is always the inflection point of S curve, showed as figure B. Suitable for the applications that the high speed area above rated frequency needs fast ACC/DEC.

When setting frequency is above rated frequency, ACC/DEC time is:

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

f is setting frequency, f_b is motor rated frequency, T is the ACC time from 0Hz to rated frequency

---

F1-08 **Name**: Time of S curve's start part **Default setting**: 0.0%

Setting range: 0.0% ~ (100.0% - F1-09)

F1-09 **Name**: Time of S curve's end part **Default setting**: 0.0%

Setting range: 0.0% ~ (100.0% - F1-08)

Function codes F1-08 and F1-09 define the time proportion of start part and end part of S-curve ACC/DEC A, these two values must be limited in F1-08 + F1-09 ≤ 100%

The time of t_1 is set by F1-08, in this section, the slope of output frequency rises gradually.
The time of t_2 is set by F1-09, in this section, the slope of output frequency change to 0 gradually, and in the section of t1 and t1, the slope of output frequency keeps the same, it is linear ACC and DEC.

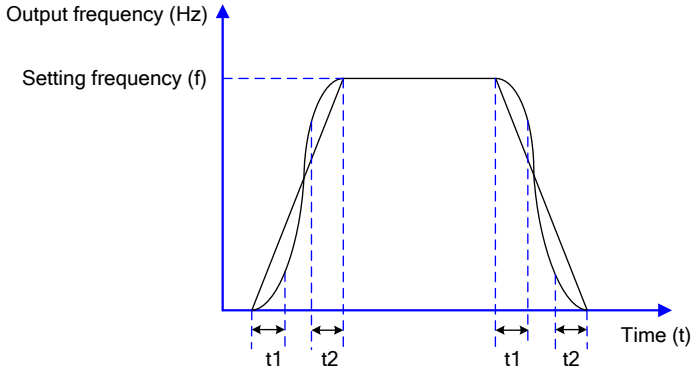


Figure A: S-curve ACC/DEC A diagram

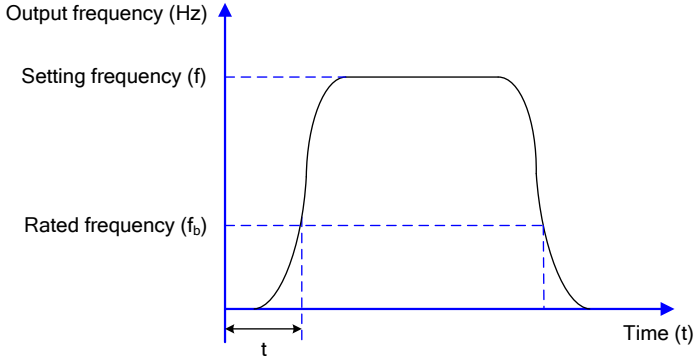


Figure B: S-curve ACC/DEC B diagram

F1-10 **Name**: Stop mode **Default setting**: 0

Setting range:

0: Deceleration to stop

1: Coast to stop

0: Deceleration to stop

After the stop command is valid, the inverter reduces the output frequency according to the DEC time and will stop after the frequency reduces to zero.

1: Coast to stop

After the stop command is valid, the inverter cut off the output immediately. The motor coasts to stop according to the mechanical inertia.

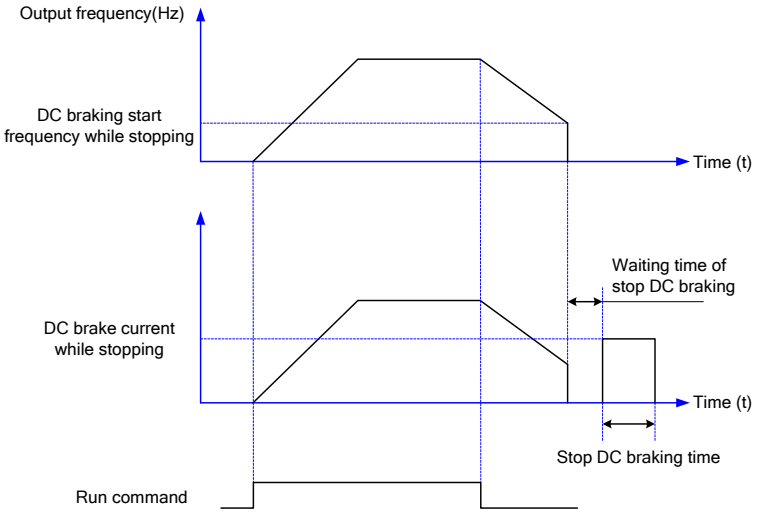
F1-11	**Name**: DC braking start frequency while stopping	**Default setting**: 0.00Hz
	Setting range: 0.00Hz ~ F0-10 (maximum frequency)	
F1-12	**Name**: DC braking delay time while stopping	**Default setting**: 0.0s
	Setting range: 0.0s ~ 100.0s	
F1-13	**Name**: DC braking current while stopping	**Default setting**: 0.0%
	Setting range: 0% ~ 100%	
F1-14	**Name:** DC braking time while stopping	**Default setting:** 0.0s
	Setting range: 0.0s ~ 100.0s	

DC braking start frequency while stopping: Start the DC braking when running frequency reaches this frequency determined by F1-11.

DC braking waiting time while stopping: Inverter cut off the output before starting the DC braking. After this waiting time, the DC braking will be started so as to prevent over-current fault caused by DC braking at high speed.

DC brake current while stopping: The value of F1-13 is the percentage of rated current of inverter. The bigger the DC braking current is, the greater the braking torque is.

DC brake time while stopping: The time which is used to perform DC braking. If the time is 0, the DC braking will be invalid.



DC braking diagram

F1-15 **Name**: Braking usage ratio **Default setting**: 100%

Setting range: 0% ~ 100%

It is only valid for the inverter with built-in brake unit, can be used to adjust the braking effect of the brake unit.

Group F2 Motor Parameters

F2-00 **Name**: Motor type **Default setting**: 0

Setting range:

0: Common asynchronous motor

1: Variable frequency asynchronous motor

Notice: Variable frequency asynchronous motor means the cooling fan of the motor has independent power supply, this motor can works at low speed without heat sink problem.

F2-01 **Name**: Motor rated power **Default setting**: Model depend

Setting range: 0.1kW ~ 1000.0kW

F2-02 **Name**: Motor rated voltage **Default setting**: Model depend

Setting range: 1V ~ 2000V

F2-03 **Name**: Motor rated current **Default setting**: Model depend

Setting range:

0.01A ~ 655.35A (Inverter power≤55kW)

0.1A ~ 6553.5A (Inverter power＞55kW)

F2-04 **Name**: Motor rated frequency **Default setting**: Model depend

Setting range: 0.00Hz ~ F0-10 (max. frequency)

F2-05 **Name**: Motor rated speed **Default setting**: Model depend

Setting range: 1 ~ 65535RPM

1. Please set the parameters correctly according to the motor nameplate.

2. In order to achieve superior control performance, please perform motor parameters autotuning. The accuracy of autotuning is closely related to the correct setting of the rated motor parameters.

F2-06 **Name**: Motor stator resistance **Default setting**: Model depend

Setting range:

0.001Ω ~ 65.535Ω (Inverter power≤55kW)

0.0001Ω ~ 6.5535Ω (Inverter power＞55kW)

F2-07 **Name**: Motor rotor resistance **Default setting**: Model depend

Setting range:

0.001Ω ~ 65.535Ω (Inverter power≤55kW)

0.0001Ω ~ 6.5535Ω (Inverter power＞55kW)

F2-08 **Name**: Motor leakage inductive **Default setting**: Model depend

Setting range:

0.01mH ~ 655.35mH (Inverter power≤55kW)

0.001mH ~ 65.535mH (Inverter power>55kW)

F2-09 **Name**: Motor mutual inductive **Default setting**: Model depend

Setting range:

0.01mH ~ 655.35mH (Inverter power≤55kW)

0.001mH ~ 65.535mH (Inverter power>55kW)

F2-10 **Name**: Motor current without load **Default setting**: Model depend

Setting range:

0.01A ~ F2-03 (rated current) (Inverter power≤55kW)

0.1A ~ F2-03 (rated current) (Inverter power>55kW)

F2-06 ~ F2-10 are motor parameters, which cannot be found on the motor nameplate, and are obtained via the inverter autotuning. The static autotuning only can obtain F2-06 ~ F2-08. The rotation autotuning not only can obtain F2-06 ~ F2-10, but also can get current loop PI parameter, etc.

When F2-01 or F2-02 changed, the inverter will change F2-06 ~ F2-10 automatically, and restore F2-06 ~ F2-10 as standard Y series motor parameters.

If motor parameters autotuning failed in the site, please input the related parameters provided by the motor manufacturer.

F2-11 **Name**: Parameters autotuning **Default setting**: 0

Setting range:

0: No action

1: Static autotuning

2: Rotation autotuning

0: No operation, prohibit motor parameter autotuning.

1: Motor parameter static autotuning

Suitable for the applications which the asynchronous motor is not easy to disconnect with the load, and cannot make rotation autotuning.

Before static autotuning, please set the motor type and motor parameters (F2-00 ~ F2-05) correctly. The inverter can obtain F2-06 ~ F2-08 via static autotuning.

Action description: Set the function code to be 1, the keypad displays “TUNE”, then press RUN key, the inverter will make static autotuning.

2: Motor parameter rotation autotuning

To ensure the dynamic control performance of inverter, please select rotation autotuning.

During the rotation autotuning, the motor must be disconnected with the load (i.e. no-load).

During rotation autotuning, the inverter will make static autotuning at first, and then accelerates to 80% motor rated frequency according to acceleration time F0-17, holding for a while, at last decelerates to stop according to deceleration time F0-18 and finish autotuning.

Before rotation autotuning, please set motor type and motor parameters F2-00 ~ F2-05, during rotation autotuning, the inverter can obtain F2-06~F2-10, vector control current loop PI parameters F3-13 ~ F3-16.

Action description: Set the function code to 2, the keypad displays “TUNE”, then press RUN key, the inverter will make rotation autotuning.

Notice: Autotuning is valid only on keypad operation mode, cannot make autotuning under terminal and communication operation modes.

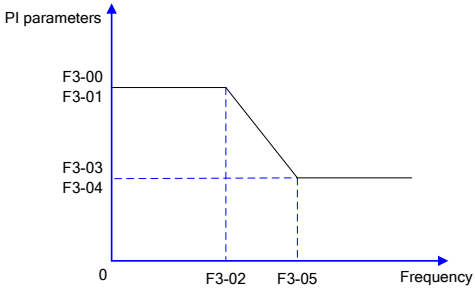
Group F3 Vector Control Parameters

Group F3 is valid only for vector control. Under V/f control mode, it is invalid. To set suitable of this group parameters, you can get better output torque.

F3-00	**Name**: Speed loop proportional gain 1 **Setting range:** 1 ~ 100	**Default setting**: 30
F3-01	**Name**: Speed loop integration time 1 **Setting range:** 0.01s ~ 10.00s	**Default setting**: 0.50s
F3-02	**Name**: Low switching frequency **Setting range:** 0.00 ~ F3-05	**Default setting**: 5.00Hz
F3-03	**Name**: Speed loop proportional gain 2 **Setting range:** 1 ~ 100	**Default setting**: 20
F3-04	**Name**: Speed loop integration time 2 **Setting range:** 0.01s ~ 10.00s	**Default setting**: 1.00s
F3-05	**Name**: High switching frequency **Setting range:** F3-02 ~ F0-10 (max. frequency)	**Default setting**: 10.00Hz

While inverter works at different frequency, different speed loop PI parameters can be set to get better performances.

F3-00 and F3-01 are PI adjustment parameters when the running frequency is lower than low switching frequency (F3-02). F3-03 and F3-04 are PI adjustment parameters when the running frequency is higher than high switching frequency (F3-05). PI parameter of frequency channel between low switching frequency and high switching frequency is linear switching between two groups of PI parameters, as shown in the figure below:



The speed dynamic response characteristics of the vector control can be adjusted by setting the proportional coefficient and integration time of the speed regulator.

Increasing the proportional gain or reducing the integration time can accelerate the dynamic

response of the speed loop. However, if the proportional gain is too large or the integration time is too short, it will cause the oscillation of the system.

Recommended adjustment method:
If factory default cannot meet the requirements, the relevant parameter values can be subject to fine tuning.
Increase the proportional gain while ensuring no oscillation to the system, and then **reduce the integration time** to ensure that the system has quick response characteristics and small overshoot.

Caution:
Improper PI parameter setting may cause too large speed overshoot. Voltage fault may occur when the overshoot drops.

F3-06 **Name**: Vector control slip compensation coefficient **Default setting**: 100%
Setting range: 50% ~ 200%

For sensorless vector control, this parameter is used to adjust the speed stabilizing precision of the motor. When the speed is too low due to heavy load of motor, this parameter needs to be enlarged, vice versa.

F3-07 **Name**: Speed loop filter time **Default setting**: 0.000s
Setting range: 0.000s ~ 0.100s

Under vector control mode, the output of speed loop regulator is torque current command. This parameter is used to filter the torque command. This parameter needs no adjustment generally and this filter time can be increased in case of huge speed fluctuation. In case of oscillation of motor, this parameter should be reduced properly.
The speed loop filter time is low, and the inverter output torque may fluctuate greatly, but the response is quick.

F3-08 **Name**: Vector control over excitation gain **Default setting**: 64
Setting range: 0 ~ 200

During deceleration, over excitation control can suppress bus voltage increase, avoid over voltage fault. The bigger over excitation gain is, the better the suppression result is.
For the application which over voltage fault happens frequently during deceleration, the over excitation gain needs to be increased. But the current would be increased if the over excitation is too bigger, so you need to set the suitable over excitation gain.
For the small inertia situation, voltage doesn't increase during motor deceleration, please set over excitation gain to 0. For the application with braking resistor, please also set over excitation gain to 0.

F3-09	**Name**: Torque upper limit source selection in speed control mode	**Default setting**: 0

Setting range:

0: F3-10

1: VI

2: CI

3: Reserved

4: Reserved

5: Communication

6: Min (VI, CI)

7: Max (VI, CI)

※ Full scale of 1-7 selection corresponds to F3-10

F3-10	**Name**: Torque upper limit digital setting	**Default setting**: 0.0%

Setting range: 0.0% ~ 200.0%

In the speed control mode, the maximum of the inverter output torque is controlled by the torque upper limit source.

F3-09 is used to select the setting source of torque upper limit. When setting via the analog value, high speed pulse HDI, communication, 100% of the relevant setting corresponds to F3-10, and 100% of F3-10 is the inverter rated torque.

F3-13	**Name**: Excitation regulation proportional gain	**Default setting**: 2000

Setting range: 0 ~ 60000

F3-14	**Name**: Excitation regulation integral gain	**Default setting**: 1300

Setting range: 0 ~ 60000

F3-15	**Name**: Torque regulation proportional gain	**Default setting**: 2000

Setting range: 0 ~ 60000

F3-16	**Name**: Torque regulation integral gain	**Default setting**: 1300

Setting range: 0 ~ 60000

F3-13 ~ F3-16 are speed loop PI adjustment parameters, they will be updated automatically after autotuning.

Notice: if the current loop PI gain is set too big, it may cause the system into oscillation, so that if the current with big oscillation or the torque with big fluctuation, customer can reduce the proportional gain and integral gain manually.

F3-17	**Name**: Speed loop integral property **Setting range:** Integral separation: 0: Invalid 1: Valid	**Default setting**: 0

Group F4 V/f Control Parameters

This group of function code is enabled only for V/f control and is invalid for vector control.
V/F control is applicable for the general loads such as fan and pump or the applications where one inverter drives multiple motors or the inverter power is one level lower or higher than the motor power.

F4-00 **Name**: V/f curve setting **Default setting**: 0

Setting range:

0: Linear
1: Multiple-points
2: Square
3: 1.2th power
4: 1.4th power
6: 1.6th power
8: 1.8th power
9: Reserved
10: V/f separate completely
11: V/f separate partially

0: Linear V/f curve. It is suitable for common constant torque load.

1: Multiple-point V/f curve. It is suitable for the special loads such as dehydrator and centrifugal machine.

2: Square V/f curve. It is suitable for the centrifugal loads such as fans and pumps.

3~8: V/f curve between linear V/f and square V/f.

9: V/f separate completely
In this mode, the inverter output frequency and voltage are mutual independent, the output frequency is defined by frequency reference source, and the output voltage is defined by F4-13 (Voltage source of V and F divide).
This mode is usually used in the applications of induction heating, power inverter, torque motor control etc.

10: V and F divide partially
In this mode, the output voltage is proportional to frequency, but the proportional relation can be adjusted by F4-13, and the proportional relation is also related to motor voltage and frequency in F1 group.

For example, if the input voltage source (F4-13) is X (value of X between 0~100%), the relationship of output voltage and frequency will be:

V/F=2 * X * (motor rated voltage) / (motor rated frequency)

F4-01 **Name**: Torque boost **Default setting**: Model depend

Setting range:

0.0: auto

0.1% ~ 30.0%

F4-02 **Name**: Cut-off frequency of torque boost **Default setting**: 50.00Hz

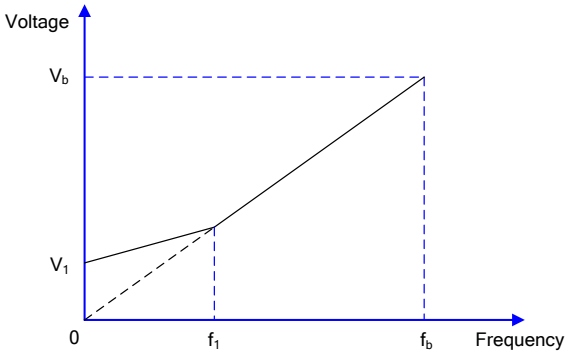
Setting range: 0.00Hz ~ F0-10 (maximum frequency)

To compensate the low frequency torque characteristics of V/f control, it can boost the inverter output voltage during low frequency. If the torque boost is set to too large, the motor may be over heat, and the inverter may be over current.

Adjust this parameter according to the different loads. Increase this parameter for heavy load, reduce it for light load.

When the torque boost is set to 0.0, the inverter will adopt auto torque boost.

Cut-off frequency of torque boost: Under this frequency, the torque boost is valid. If it exceeds this setting frequency, the torque boost is invalid. Refer to Figure 6-3 for details.



Manual torque boost diagram

F4-03 **Name**: V/f frequency point 1 **Default setting**: 0.00Hz

Setting range: 0.00Hz ~ F4-05

F4-04 **Name**: V/f voltage point 1 **Default setting**: 0.0%

Setting range: 0.0% ~ 100.0%

F4-05 **Name**: V/f frequency point 2 **Default setting**: 0.00Hz

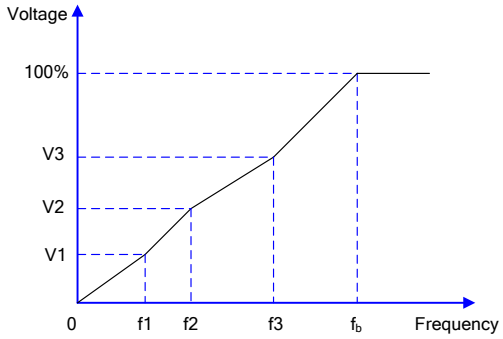
Setting range: F4-03 ~ F4-07

F4-06 **Name**: V/f voltage point 2 **Default setting:** 0.0%
Setting range: 0.0% ~ 100.0%

F4-07 **Name**: V/f frequency point 3 **Default setting**: 0.00Hz
Setting range: F4-05 ~ F2-04 (motor rated frequency)

F4-08 **Name**: V/f voltage point 3 **Default setting:** 0.0%
Setting range: 0.0% ~ 100.0%

Multi-step V/f curve is defined by F4-03 to F4-08.
The curve of multi point V/f is generally set according to the load characteristics of the motor.
Caution: V1<V2<V3 and f1<f2<f3. The voltage corresponding to low frequency should not be set too high, otherwise it may cause motor overheat or inverter fault.



V/f curve setting diagram

F4-09 **Name**: V/f slip compensation gain **Default setting**: 0.0%
Setting range: 0.0% ~ 200.0%

Setting this parameter can compensate the slip of motor speed caused by the load increases, and makes the motor speed stably when the load changes.

V/F slip compensation gain set to 100% means the slip compensation of the motor with rated load is the motor rated slip, which can be calculated according to motor rated power and motor rated speed automatically.

Slip gain adjustment can refer to the following principle: When the load is rated load, the motor speed is basically the same as the target speed. When the values are different, please adjust this gain properly.

F4-10 **Name**: V/f over excitation gain **Default setting**: 64
Setting range: 0 ~ 200

During deceleration, over excitation control can suppress bus voltage increase, avoid over voltage fault. The bigger over excitation gain is, the better suppression result is.

For the application which over voltage fault happens frequently during deceleration, the over excitation gain needs to be increased. But the current would be increased if the over excitation is too bigger, so you need to set the suitable over excitation gain.

For the small inertia situation, voltage doesn't increase during motor deceleration, please set over excitation gain to 0. For the application with braking resistor, please also set over excitation gain to 0.

F4-11 **Name**: V/f oscillation suppression gain **Default setting**: Model depend

Setting range: 0 ~ 100

Set the gain as small as possible on the premise that there is effective oscillation suppression measure, which can avoid the affect causing to VF running. Set the gain to 0 when the motor has no oscillation. Only when the motor has obvious oscillation, this gain can be increased properly. The bigger the gain is, the better oscillation suppression result will be.

When using this function, please make sure the motor rated current and no load current parameters are accurate, otherwise V/F oscillation suppression result would be bad.

F4-13 **Name**: Voltage source of V/f separation **Default setting**: 0

Setting range:

0: Digital setting (F4-14)

1: VI

2: CI

3: Reserved

4: Reserved

5: Multi-step speed

6: Simple PLC

7: PID

8: Communication

※100% corresponds to motor rated voltage

F4-14 **Name**: Digital setting of V/f separation **Default setting**: 0V

Setting range: 0~F2-02 (Motor rated voltage)

When select V/f separation control mode, the output voltage can be controlled by F4-14, and also can from analog input, multi-step speed, simple PLC and communication signal. While using non-digital setting, the 100% setting correspond to motor rated voltage, if the analog signal are set as negative value, the effective value is the absolute value

0: Digital setting (F4-14)

The voltage is set by F4-14.

1: VI

Voltage signal input (0~10V)

2: CI

Current signal input (4~20mA)

3: Reserved

4: Reserved

5: Multi-step speed

Related parameters are F5 and FD groups' parameters.

6: Simple PLC

Related parameters are FD group's parameters.

7: PID

The output voltage will be controlled by PID calculation, please refer to F9 group parameters.

8: Communication

The output voltage will be controlled by upper monitor via communication way.

For the above setting of 1~8, 0~100% correspond the output voltage of 0V~motor rated voltage.

F4-15 **Name**: Voltage rise up time of V/f separation **Default setting**: 0.0s

Setting range: 0.00s~1000.0s

It is to set the voltage rise up time from 0V to motor rated voltage

Group F5 Input Terminals

KD series inverters build-in 5 digital input terminals and 2 analog input terminals standardly.

F5-00 **Name**: MI1 terminal function **Default setting**: 1

F5-01 **Name**: MI2 terminal function **Default setting**: 2

F5-02 **Name**: MI3 terminal function **Default setting**: 0

F5-03 **Name**: MI4 terminal function **Default setting**: 0

F5-04 **Name**: MI5 terminal function **Default setting**: 0

Setting range:

0: No function
1: Forward (FWD)
2: Reverse (REV)
3: Three-line running control
4: Forward Jog (FJOG)
5: Reverse Jog (RJOG)
6: Terminal UP
7: Terminal DOWN
8: Coast to stop
9: Fault reset (RESET)
10: Pause running
11: External fault (normal open) input
12: Multi-step speed terminal 1
13: Multi-step speed terminal 2
14: Multi-step speed terminal 3
15: Multi-step speed terminal 4
16: ACC/DEC selection terminal 1
17: ACC/DEC selection terminal 2
18: Main frequency source switching
19: UP and DOWN setting clear (terminal and keypad)
20: Running command switching terminal
21: ACC/DEC invalid
22: PID Pause
23: PLC status reset
24: Wobble frequency pause
25: Counter input
26: Counter reset
27: Length count input
28: Length reset
29: Torque control invalid
30~31: Reserved

32: DC braking command
33: External fault (normal closed) input
34: Frequency modification enabled
35: PID action direction reverse
36: External stop terminal 1
37: Control command switching terminal 2
38: PID integration stop
39: Switch frequency source A to preset frequency
40: Switch frequency source B to preset frequency
41~42: Reserved
43: PID parameter switching
44~45: Reserved
46: Speed control / torque control switching
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: The running time reset

Functions list

Setting value	Function	Description
0	No function	The no operation function can be set on the unused terminals so as to prevent error action.
1	Forward (FWD)	Control the inverter forward and reverse via the external terminals.
2	Reverse (REV)	
3	Three-line running control	This terminal is used to confirm that the inverter running mode is three-line control mode. Refer to F5-11 (terminal command mode) for details.
4	Forward Jog (FJOG)	FJOG refers to Jog forward running, RJOG refers to Jog reverse running. Regarding Jog running frequency and Jog ACC/DEC time, please refer to F8-00, F8-01 and F8-02.
5	Reverse Jog (RJOG)	
6	Terminal UP	When the frequency is given by the external terminals, it is used as increment and decrement commands of frequency modification. When the frequency source is set by digital, it can be used to adjust the setting frequency.
7	Terminal DOWN	
8	Coast to stop	The inverter locks the output, and the motor stop process is beyond the inverter control. This mode is the same as the meaning of coast-to-stop as described in F1-10.
9	Fault reset (RESET)	External fault reset function. It is the same as the function of RESET key on the keyboard. Using this function can realize long-distance fault reset.

Setting value	Function	Description
10	Pause running	The inverter decelerates to stop, but all the running parameters are in the memory status, such as simple PLC parameters, wobble frequency parameters and PID parameters. After this signal disappears, the inverter restores to the status before stopping.
11	External fault normally open input	After the signal is sent to the inverter, the inverter reports fault Err15 and stops immediately.
12	Multi-step speed terminal 1	It can realize 16 steps or 16 other command setting through 16 statuses of the four terminals. See below table 1.
13	Multi-step speed terminal 2	
14	Multi-step speed terminal 3	
15	Multi-step speed terminal 4	
16	ACC/DEC time selection terminal 1	It can select four types of ACC/DEC time though 4 statuses of the two terminals. See below table 2.
17	ACC/DEC time selection terminal 2	
18	Main frequency source switching	Used to switch different frequency source. According to the setting of frequency source selection (F0-07), when setting switching between two frequency sources is frequency source, it can achieve switching two frequency sources via this terminal
19	UP and DOWN setting clear (terminal and keyboard)	When the frequency reference is digital frequency reference, this terminal can be used to clear the frequency value modified by UP/DOWN and thus restore the reference frequency to the setting value of F0-08.
20	Running command switching terminal	When the command source (F0-02) is set to 1, it performs switching between terminal control and keyboard control via this terminal. When the command source (F0-02) is set to 2, it performs switching between communication control and keyboard control via this terminal.
21	ACC/DEC invalid	Protect the inverter from affecting by the external signals (except stop command), and maintain the current frequency.
22	PID Pause	PID is invalid temporarily, and the inverter maintains the current frequency output, no longer adjusts PID of frequency source.
23	PLC status reset	PLC pauses during the execution process. When it runs again, it can restore to the initial status of simple PLC via this terminal.

Setting value	Function	Description
24	Wobble frequency pause	The inverter outputs the central frequency. Wobble frequency function pauses.
25	Counter input	The input terminal of counting pulse.
26	Counter reset	Clear the counter status.
27	Length count input	Input terminal of length counting.
28	Length reset	Length clear
29	Torque control invalid	Torque control is invalid, the inverter adopts speed control mode.
30	Reserved	Reserved
31	Reserved	Reserved
32	DC braking command	When this terminal is valid, and the inverter directly switches to DC braking status.
33	External fault normal close input	After the external fault normal close signal is sent to the inverter, the inverter reports fault Err15 and stops.
34	Frequency modification enabled	If this function is valid, the inverter does not response to the frequency changing, until this terminal is invalid
35	PID action direction reverse	When this terminal is valid, PID action direction is the opposite of value set by F9-03.
36	External stop terminal 1	The inverter can be stopped by this terminal under keypad control, which has the same function as STOP key's.
37	Control command switching terminal 2	Used to switch between terminal control and communication control. If command source selection is set to terminal control, then the system switches to communication control when the terminal is valid, vice versa.
38	PID integration stop	When this terminal is valid, PID integration adjustment function will stop working, but PID ratio adjustment & differential adjustment function are still valid.
39	Switch frequency source A to preset frequency	When this terminal is valid, frequency source A is replaced by preset frequency (F0-08)
40	Switch frequency source B to preset frequency	When this terminal is valid, frequency source B is replaced by preset frequency (F0-08)
41	Reserved	

Setting value	Function	Description
42		
43	PID parameter switching	When PID parameter switching condition is MI terminal (F9-18=1) and this terminal is invalid, PID parameter is determined by F9-05 ~ F9-07. When this terminal is valid, PID parameter is determined by F9-15 ~F9-17
44	Reserved	
45		
46	Speed control/torque control switching	Make the inverter switches between speed control and torque control mode. When this terminal is invalid, the inverter runs at the mode set by FE-00 (speed/torque control mode), the inverter switches to another mode when the terminal is valid.
47	Emergency stop	When the terminal is valid, the inverter stops with fastest speed, during the process, the current is as upper limits are set. This function applied in the situation which the inverter needs to stop ASAP when the system is in emergency status.
48	External stop terminal 2	In any control mode (Keypad control, terminal control, communication control), the inverter can decelerate to stop via this terminal & the deceleration time is DEC time 4.
49	Deceleration DC braking	When this terminal is valid, the inverter decelerates to the stop DC braking starting frequency, then switches to DC braking status.
50	The running time reset	When the terminal is valid, the inverter will clear the running time to zero, this function need to be used together with timing running (F8-42) and this running time arrival F8-53).

Four multi-step speed terminals can get 16 different combinations, these 16 combinations correspond to 16 multi-steps speeds, the detailed corresponding relations are shown as below list:

K4	K3	K2	K1	Command setting	Corresponding parameter
OFF	OFF	OFF	OFF	Multi-step command 0	FD-00
OFF	OFF	OFF	ON	Multi-step command 1	FD-01
OFF	OFF	ON	OFF	Multi-step command 2	FD-02
OFF	OFF	ON	ON	Multi-step command 3	FD-03
OFF	ON	OFF	OFF	Multi-step command 4	FD-04
OFF	ON	OFF	ON	Multi-step command 5	FD-05
OFF	ON	ON	OFF	Multi-step command 6	FD-06

OFF	ON	ON	ON	Multi-step command 7	FD-07
ON	OFF	OFF	OFF	Multi-step command 8	FD-08
ON	OFF	OFF	ON	Multi-step command 9	FD-09
ON	OFF	ON	OFF	Multi-step command 10	FD-10
ON	OFF	ON	ON	Multi-step command 11	FD-11
ON	ON	OFF	OFF	Multi-step command 12	FD-12
ON	ON	OFF	ON	Multi-step command 13	FD-13
ON	ON	ON	OFF	Multi-step command 14	FD-14
ON	ON	ON	ON	Multi-step command 15	FD-15

Two ACC/DEC time selection terminals (16 and 17) can get 4 different combinations, these 4 combinations correspond to 4 ACC/DEC settings, the detailed corresponding relations are shown as below list:

Terminal 2	Terminal 1	Acceleration or deceleration time selection	Corresponding parameter
OFF	OFF	ACC time/DEC time 1	F0-17. F0-18
OFF	ON	ACC time/DEC time 2	F8-03. F8-04
ON	OFF	ACC time/DEC time 3	F8-05. F8-06
ON	ON	ACC time/DEC time 4	F8-07. F8-08

F5-10 **Name**: MI terminals filter time **Default setting**: 0.010s

Setting range: 0.000s ~ 1.000s

It is used to set the sensitivity of MI terminals. If the digital input terminals are interfered easily and may cause error action, to increase this parameter value to enhance the anti-interference capability. However, this operation will reduce the sensitivity of MI terminal.

F5-11 **Name**: Terminal command mode **Default setting**: 0

Setting range:

0: Two-line mode 1

1: Two-line mode 2

2: Three-line mode 1

3: Three-line mode 2

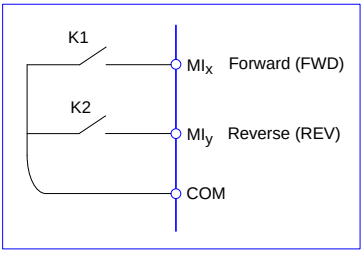
This parameter defines four different modes of controlling the operation of the inverter via the external terminals.

0: Two-line running mode 1:

This is the most common mode. The forward/reverse rotation of the motor is decided by the commands of FWD and REV terminals.

Terminal	Setting value	Description
MI_x	1	Forward running (FWD)
MI_y	2	Reverse running (REV)

K1	K2	Run command
OFF0	OFF	Stop
OFF	ON	Reverse
ON	OFF	Forward
ON	ON	Stop

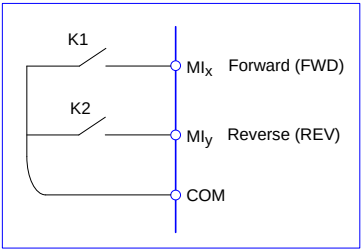


1: Two-line running mode 2:

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

Terminal	Terminal	Description
MI_x	1	Run enable
MI_y	2	Forward / Reverse run control

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



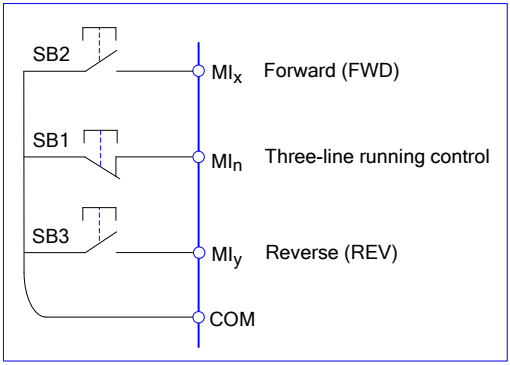
2: Three-line running mode 1:

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

Terminal	Setting value	Description
MI_x	1	Forward running (FWD)
MI_y	2	Reverse running (REV)
MI_n	3	Three-line running control

To make the inverter run, users must close MI_n terminal firstly. It can achieve the motor forward or reverse control via pulse rising of MI_x or MI_y.

It can achieve the inverter stop via cutting off MI_n terminal signal. MI_x. MI_y. MI_n are MI1～MI6, the valid input of MI_x (MI_y) is pulses signal, and the valid input of MI_n is level signal.



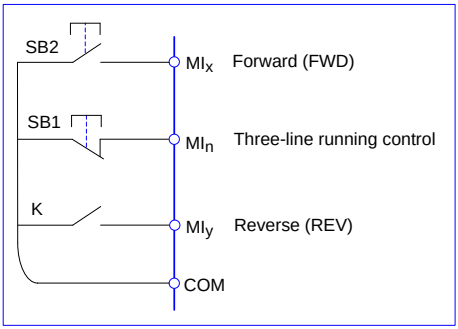
SB1: Stop button
SB2: Forward rotation button
SB3: Reverse rotation button

3: Three-line running mode 2:

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

Terminal	Setting value	Description
MI_x	1	Run enable
MI_y	2	Forward / Reverse run\ control
MI_n	3	Three-line running control

K	Running direction
OFF	Forward
ON	Reverse



To make the inverter to start, users must close MI_n terminal firstly, and then the motor running signal will be generated by MI_x pulse rising edge and the motor direction signal will be generated by MI_y status.

It can achieve the inverter stop via cutting off MI_n terminal signal. MI_x. MI_y. MI_n are MI1～MI5, the valid input of MI_x is pulses signal, and the valid input of MI_n (MI_y) is level signal.

F5-12 **Name**: UP/DOWN change rate **Default setting**: 1.000Hz/s
Setting range: 0.001Hz/s ~ 65.535Hz/s

Terminals UP/DOWN is used to adjust the change rate when setting frequency.
When F0-22 is set to 2, the range is 0.001~65.535Hz/s.
When F0-22 is set to 1, the range is 0.01~655.35Hz/s.

F5-13 **Name**: VI minimum input **Default setting**: 0V
Setting range: 0.00 ~ 10.00V

F5-14 **Name**: VI minimum input corresponding setting **Default setting**: 0.0%
Setting range: -100.0% ~ +100.0%

F5-15 **Name**: VI maximum input **Default setting**: 10.00V
Setting range: 0.00 ~ 10.00V

F5-16 **Name**: VI maximum input corresponding setting **Default setting**: 100.0%
Setting range: -100.0% ~ +100.0%

F5-17 **Name**: VI filter time **Default setting**: 0.10s
Setting range: 0.00s ~ 10.00s

The above function codes define the relationship between the analog input voltage and analog input setting value.

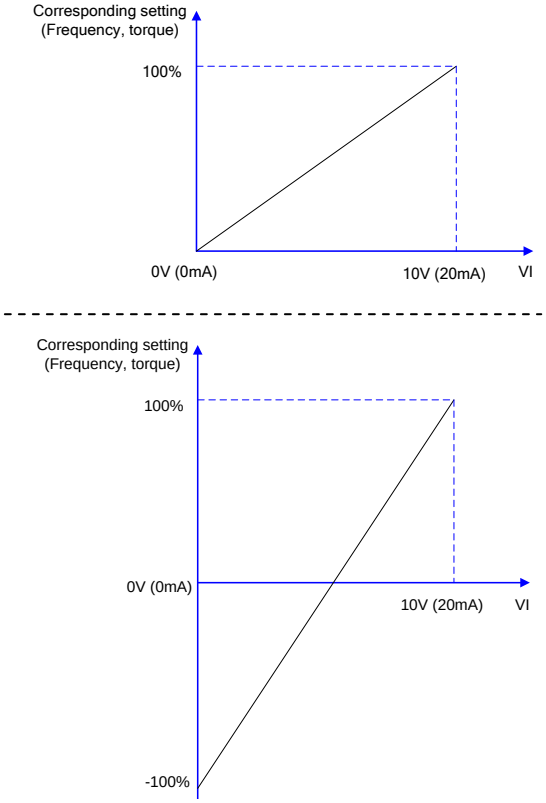
If the input voltage signal exceeds the range of upper limit or lower limit, the exceeded value will be calculated as upper limit or lower limit value.

When the analog input is current input, **1mA current equals to 0.5V voltage**.

VI input filter time is used to set VI software filter time, when the VI signal on the site is disturbed easily, please increase filter time to stable the detected analog signal, but the bigger the filter time is, the slower the response speed of the analog detection is. So please set suitable value according to the situation.

In difference applications, 100% of analog input corresponds to different nominal values.

Several setting examples are shown in the following figures:



Corresponding Relationship between Analog Reference and Setting

F5-18	**Name**: CI minimum input **Setting range:** 0.00 ~ 10.00V	**Default setting**: 0V

F5-19	**Name**: CI minimum input corresponding setting **Setting range:** -100.0% ~ +100.0%	**Default setting**: 0.0%

F5-20	**Name**: CI maximum input **Setting range:** 0.00 ~ 10.00V	**Default setting**: 10.00V
F5-21	**Name**: CI maximum input corresponding setting **Setting range:** -100.0% ~ +100.0%	**Default setting**: 100.0%
F5-22	**Name**: CI filter time **Setting range:** 0.00s ~ 10.00s Please refer to VI settings for CI input.	**Default setting**: 0.10s
F5-57	**Name**: MI2 delay time **Setting range:** 0.0s ~ 3600.0s	**Default setting**: 0.0s
F5-58	**Name**: MI3 delay time **Setting range:** 0.0s ~ 3600.0s	**Default setting**: 0.0s
F5-59	**Name**: MI1 delay time **Setting range:** 0.0s ~ 3600.0s Used to set the delay time when MI terminals status changing. ※ Currently only MI1, MI2, MI3 have the setting delay time function.	**Default setting**: 0.0s
F5-59	**Name**: MI terminal valid mode selection **Setting range:** 0: Active-high level signal 1: Active-low level signal ➢ Units place: MI1 ➢ Tens place: MI2 ➢ Hundreds place: MI3 ➢ Thousands place: MI4 ➢ Ten thousands place: MI5 They are used to set the digital input terminal active status mode. If the selection is active-high level signal, the relevant MI terminal connects with COM is valid, disconnect invalid. If the selection is active-low level signal, the relevant MI terminal connects with COM is invalid, disconnect valid.	**Default setting**: 00000

Group F6 Output Terminals

KD series inverters build-in 2 open collector output terminals, 2 relay output terminals and 2 analog output terminals standardly.

F6-00 **Name**: MO1 output function selection (Open collector output) **Default setting**: 0

F6-01 **Name**: Relay 1 output selection (TA, TB, TC) **Default setting**: 2

F6-02 **Reserved**

F6-03 **Name**: MO2 output function selection (Open collector output) **Default setting**: 0

F6-04 **Name**: Relay 2 output selection (TA1, TB1) **Default setting**: 0

Setting range:

0: No output
1: Inverter is running
2: Fault output (fault stop)
3: FDT1 output
4: Frequency arrival
5: Zero-speed running (no output when stop)
6: Motor overload pre-alarm
7: Inverter overload pre-alarm
8: Setting count value arrival
9: Designated count value arrival
10: Length arrival
11: Simple PLC circulate running completed
12: Accumulated running time arrival
13: Frequency limiting
14: Torque limiting
15: Ready for running
16: VI>CI
17: Frequency upper limit arrival
18: Frequency lower limit arrival
19: Under voltage status output
20: Communication setting
21: Position fixed (reserved)
22: Position approach (reserved)
23: Zero-speed running 2 (output when stop)
24: Accumulated power-on time arrival

25: FDT2 output
26: Frequency 1 arrival output
27: Frequency 2 arrival output
28: Current 1 arrival output
29: Current 2 arrival output
30: Timing arrival output
31: VI input over limit
32: Off load
33: Reverse running
34: Zero-current status
35: Module temperature arrival
36: Output current over limit
37: Lower limit frequency arrival (output when stop)
38: Warning output (keep running)
39: Motor over temperature pre-alarm
40: This running time arrival

The parameters are used to select the functions of 3 digital outputs.
Multifunctional output terminal function selection is as follows

Setting value	Function	Description
0	No output	The output terminals do not have any functions.
1	Inverter is running	It indicates the inverter is running, and there is output frequency (can be zero), and the inverter outputs ON signal at this time.
2	Fault output (fault stop)	When the inverter is faulty & it stops, it outputs ON signal.
3	FDT1 output	Please refer to F8-19 and F8-20 for details.
4	Frequency arrival	Please refer to F8-21 for details.
5	Zero speed running (no output when stop)	When the inverter is running & the output frequency is 0, it outputs ON signal. When the inverter stopped, the signal is OFF.
6	Motor overload pre-alarm	Judgment will be made according to the pre-warning threshold value before the motor overload protection action. If it exceeds the pre-warning threshold, it will output ON signal. Motor overload parameters are set in FA-00 to FA-02.
7	Inverter overload pre-alarm	The inverter outputs ON signal 10s before overload protection action
8	Setting count value arrival	When the counting value reaches the setting value of FB-08, it outputs ON signal.

Setting value	Function	Description
9	Designated count value arrival	When the counting value reaches the setting value of FB-09, it outputs ON signal. Refer to Group FB function description for the counting function.
10	Length arrival	When the measured actual length exceeds the setting value of FB-05, it outputs ON signal.
11	PLC circulation completion	When the simple PLC has been running for one cycle, it outputs a pulse signal with width of 250ms.
12	Accumulated running time arrival	When the accumulated running time of the inverter exceeds the setting time F8-17, it outputs ON signal.
13	Frequency limiting	When the setting frequency exceeds the frequency upper limit or frequency lower limit, and the output frequency of the inverter reaches the frequency upper limit or frequency lower limit, it outputs ON signal.
14	Torque limiting	In speed control mode, when the output torque reaches torque limit, the inverter is in stall protection status and outputs ON signal.
15	Ready for running	When the main circuit and control circuit power supply are connected, the inverter protection function is invalid, and the inverter is in running status, it outputs ON signal.
16	VI>CI	When analog input VI is bigger than CI, the inverter outputs ON signal.
17	Frequency upper limit arrival	When the running frequency reaches frequency upper limit, it outputs ON signal.
18	Frequency lower limit arrival (no output when stop)	When the running frequency reaches frequency lower limit, it outputs ON signal. The signal is OFF when stop.
19	Under voltage status output	During under voltage, the inverter outputs ON signal.
20	Communication setting	Refer to the communication protocol
21	Reserved	
22		
23	Zero-speed running 2 (output when stop)	When the output frequency is 0Hz, the inverter outputs ON signal. The signal is still ON when stop.
24	Accumulated power-on time arrival	The accumulated power-on time (F7-13) exceeds the time set by F8-16, the inverter outputs ON signal.
25	FDT2 output	Please refer to F8-28, F8-29 description.
26	Frequency 1 arrival output	Please refer to F8-30, F8-31 description.

Setting value	Function	Description
27	Frequency 2 arrival output	Please refer to F8-32, F8-33 description.
28	Current 1 arrival output	Please refer to F8-38, F8-39 description.
29	Current 2 arrival output	Please refer to F8-40, F8-41 description.
30	Timing arrival output	When timing function selection (F8-42) is valid, after the running time arrives the set timing, outputs ON signal.
31	VI input over limit	When analog input VI is bigger than F8-46 (VI input protection upper limit) or lower than F8-45 (VI input protection lower limit), outputs ON signal.
32	Off load	When inverter is in the off-load state (FA-64 and FA-65), it outputs ON signal.
33	Reverse running	When reverse running, the inverter outputs ON signal.
34	Zero current status	Please refer to description of F8-34, F8-35.
35	Module temperature arrival	The temperature of converter module radiator (F7-07) reaches the set value of module temperature arrival (F8-47), the inverter outputs ON signal.
36	Output current over limit	Please refer to description of F8-36, F8-37.
37	Lower limit frequency arrival (output when stop)	When running frequency reaches lower limit frequency (F0-14), outputs ON signal. The signal is still ON when stop.
38	Warming output (keep running)	When a fault happens & the process mode of this fault is keeping running, the inverter outputs warming.
39	Reserved	
40	This running time arrival	This running time exceeds the time set by F8-53, the inverter outputs ON signal.

F6-07 **Name**: AM output function selection **Default setting**: 0

F6-08 **Name**: FM output function selection **Default setting**: 1

Setting range:

0: Running frequency

1: Setting frequency

2: Output current

3: Output torque

4: Output power

5: Output voltage

6: Reserved

7: VI

8: CI
9: Reserved
10: Length
11: Count value
12: Communication
13: Motor speed
14: Output current (100.0% corresponds to 1000.0A)
15: Output voltage (100.0% corresponds to 1000.0V)
16: Reserved

The output range of **FM is 0 ~ 10V** and **AM is 0~10V / 4 ~ 20mA**.
The corresponding value range that it indicates is shown in the table below:

Setting value	Function	Range
0	Running frequency	0 ~ maximum output frequency
1	Setting frequency	0 ~ maximum output frequency
2	Output current	0 ~ 2 times motor rated current
3	Output torque	0 ~ 2 times motor rated torque
4	Output power	0 ~ 2 times rated power
5	Output voltage	0 ~ 1.2 times inverter rated voltage
6	Reserved	
7	VI	0V ~ 10V
8	CI	0V ~ 10V (or 4 ~ 20mA)
9	Reserved	
10	Length	0 ~ maximum setting length
11	Count value	0 ~ maximum count value
12	Communication	0.0% ~ 100.0%
13	Motor speed	0 ~ maximum output frequency corresponding speed
14	Output current	0.0A~1000.0A
15	Output voltage	0.0V~1000.0V
16	Reserved	

F6-10 **Name**: AM offset coefficient **Default setting**: 0.0%
Setting range: -100.0% ~ +100.0%

F6-11 **Name**: AM gain **Default setting**: 1.00V
Setting range: -10.00V ~ +10.00V

F6-12 **Name**: FM offset coefficient **Default setting**: 0.0%
Setting range: -100.0% ~ +100.0%

F6-13 **Name**: FM gain **Default setting**: 1.00V
Setting range: -10.00V ~ +10.00V

The parameters are used to correct the zero drift of the analog output and the output amplitude deviation. They can also be used to define customized AM / FM output curve.

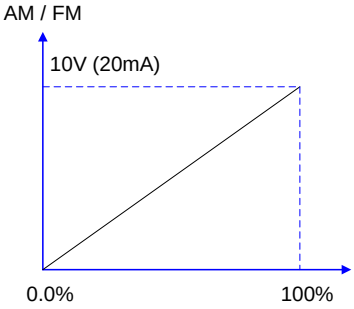
If “b” represents zero offset, k represents gain, Y represents actual output, and X represents standard output, the actual output is: Y=kX+b;

Where,

100% of zero-offset coefficients of AM and FM correspond to 10V (or 20mA).

Standard output denotes 0 to maximum analog output corresponding to the output of 0 ~10V (or 4 ~ 20mA) without Zero-offset and gain correction.

For example, if the analog output function is set as running frequency, we need it output 8V at 0Hz, and the maximum output frequency output 3V, in this condition, we should set the gain to be “-0.50”, and the offset coefficient to be “80%”



F6-18 **Name**: Relay 1 output delay time **Default setting**: 0.0s
Setting range: 0.0s ~ 3600.0s

F6-19 **Name**: Relay 2 output delay time **Default setting**: 0.0s
Setting range: 0.0s ~ 3600.0s

F6-20 **Name**: MO1 output delay time **Default setting**: 0.0s
Setting range: 0.0s ~ 3600.0s

F6-21 **Name**: MO2 output delay time **Default setting**: 0.0s
Setting range: 0.0s ~ 3600.0s

Set the delay time of output terminal relay 1, relay 2, MO1 and MO2. The delay time is time interval from the status changing to actual output changing.

F6-22 **Name**: Output terminal valid status selection **Default setting**: 00000
Setting range:
0: Positive logic
1: Negative logic
- Units place: MO1
- Tens place: Relay 1
- Hundreds place: Relay 2
- Thousands place: MO2
- Ten thousands place: Reserved

The output logic of output terminal relay 1, relay 2, MO1 and MO2.
0: Positive logic, the digital output terminal connects with the relevant COM is valid, disconnect invalid.
1: Negative logic, the digital output terminal connects with the relevant COM is invalid, disconnect valid.

Group F7 Keypad and Display

F7-00 **Name**: User password **Default setting**: 0

Setting range: 0 ~ 65535

Any non-zero number can be set, and then the password protection function will be enabled. When user enters into the menu next time, "-----" will be displayed, please input the right password, otherwise the parameters cannot be checked or modified.

Set F7-00 to be 00000: clear the previous password and disable the password protection function.

F7-01 **Name**: REV/JOG function selection **Default setting**: 0

Setting range:

0: Invalid

1: Switching between keypad command and remote command
(Remote command means terminal command or communication command)

2: FDW/REV Switching

3: Forward Jog

4: Reverse Jog

REV/JOG is a multifunctional key, whose function can be defined by the value

0: This key is invalid

1: Switching between keyboard command and remote operation.
It refers to switching of command source, switching between the current command source and the keyboard control (local operation). If the current command source is keyboard control, this key is invalid.

2: Press REV/JOG, the running direction of inverter will change. It is only valid when keypad command is valid.

3: It realizes forward jog via REV/JOG key.

4: It realizes reverse jog via REV/JOG key.

F7-03 **Name**: Running status display 1 **Default setting**: 1F

Setting range: 0000 ~ FFFF

F7-04 **Name**: Running status display 2 **Default setting**: 0

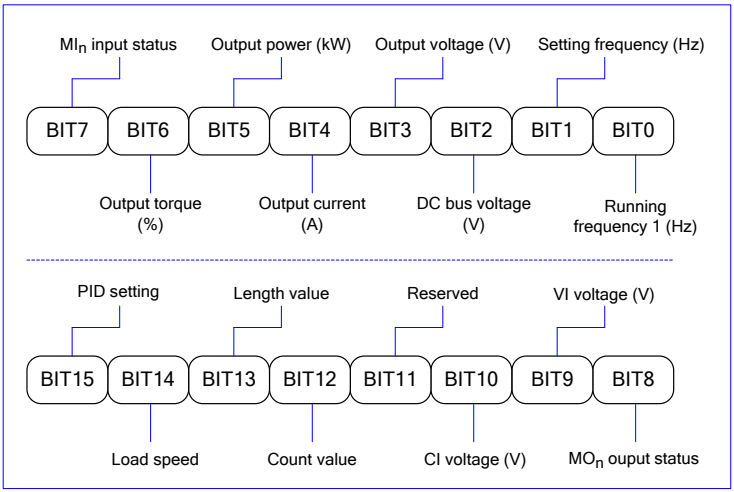
Setting range: 0000 ~ FFFF

To set the parameters which can be viewed when running.

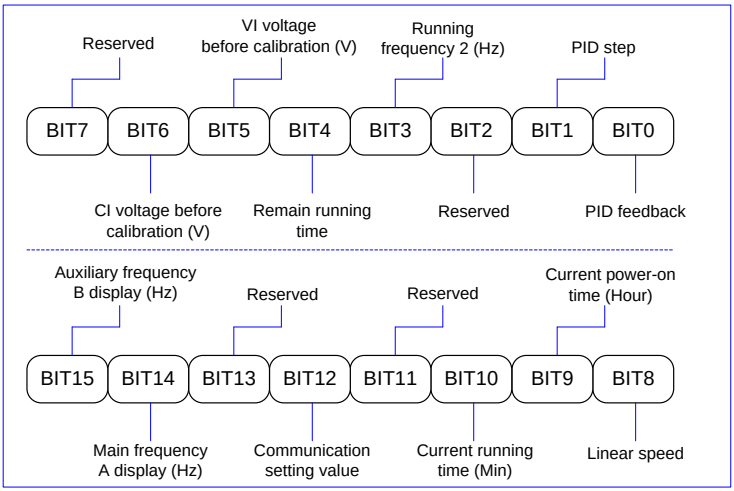
If the above parameters need to be displayed when running, **set the corresponding position to 1**, **and change every four bits of binary numbers into one hexadecimal number**, **and then**

enter the four hexadecimal numbers into F7-03 and F7-04.

Running status display 1:



Running status display 2:



For example, if user wants to display output voltage, DC bus voltage, setting frequency, running frequency, output current, output torque, VI voltage, CI voltage, output terminal status, the value of each bit is as the following table:

BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
0	0	1	1	1	1	1	1
3				**F**			
BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
0	0	0	0	0	1	1	1
0				**7**			

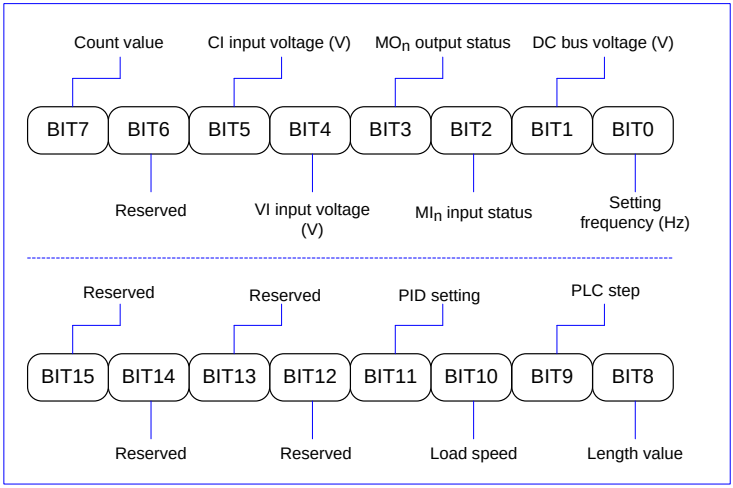
The value of F7-03 is **073F**.

F7-05 **Name**: Stop status display **Default setting**: 33

Setting range: 0000 ~ FFFF

To set the parameters which can be viewed when stopping.

It has the same setting principle like F7-03 and F7-04.



F7-06 **Name**: Load speed display coefficient **Default setting**: 1.0000

Setting range: 0.0001 ~ 6.5000

When the load speed needs to be displayed, the correspondence of the inverter output frequency and the load speed can be adjusted via this parameter.

※ Please refer to F7-12 to get more details.

F7-07 **Name**: IGBT module temperature **Default setting**: -

Setting range: 0.0℃ ~ 100.0℃

Display IGBT module temperature.

※ The over temperature protection values of different IGBT modules are not the same.

F7-08 **Name**: The second LED display values **Default setting**: 04

Setting range:

00: Running frequency 1 (Hz)
01: Setting frequency (Hz)
02: DC Bus voltage (V)
03: Output voltage (V)
04: Output current (A)
05: Output power (kW)
06: Output torque (%)
07: MI input status
08: MO output status
09: VI voltage (V)
10: CI voltage (V)
11: Inverter temperature
12: Count value
13: Length value
14: Load speed display
15: PID setting
16: PLC feedback
17: PID step
19: Communication setting frequency
19: Main frequency A display (Hz)
20: Auxiliary frequency B display (Hz)
21: Current power-on time (Hour)
22: Current running time (Min)
23: Accumulated running time
24: Remain running time

To set the second LED displays value.

F7-09 **Name**: Accumulated running time **Default setting**: -

Setting range: 0h ~ 65535h

It displays the accumulated running time of the inverter. When the running time reaches the value set by F8-17, the digital output terminal (12) outputs ON signal.

F7-10 **Name**: Model No. **Default setting**: -

Setting range: Inverter model No.

F7-11 **Name**: Software version No **Default setting**: -

Setting range: Inverter software version No.

F7-12 **Name**: Load speed display decimal place **Default setting**: 1

Setting range:

0: 0 decimal place

1: 1 decimal place

2: 2 decimal places

3: 3 decimal places

The parameters are used to set load speed display decimal place. Take the following load speed calculation format as example:

If load speed display factor (F7-06) is 2.000, load speed decimal place (F7-12) is 2 (2 decimal places), when the running frequency is 40.00Hz, load speed is: 40.00×2.000=80.00 (2 decimal places displayed)

If the inverter stops, load speed is displayed as setting frequency corresponding speed, namely "setting load speed". If setting frequency=50.00Hz, the stop status load speed is: 50.00×2.000=100.00 (2 decimal places displayed)

F7-13 **Name**: Accumulated Power-on time **Default setting**: -

Setting range: 0h ~ 65535h

It displays the accumulated power-on time after manufacturing.

When this time reaches the value set by F8-16, the inverter multifunctional digital output function (24) outputs ON signal.

F7-14 **Name**: Accumulated power consumption **Default setting**: -

Setting range: 0kW ~ 65535kW

It displays the accumulated power consumption till now.

F7-15 **Name**: Function codes modification attribute **Default setting**: 0

Setting range:

0: Disable

1: Enable

To set whether the function parameters can be modified or not, is used to protect function parameters are modified improperly.

When this function code is set to 0, all the parameters can be modified, when the function code is set to 1, all the parameters only can be viewed, but not modified.

Group F8 Enhanced Function

F8-00	**Name**: Jog running frequency **Setting range:** 0.00Hz ~ F0-10 (max. frequency)	**Default setting**: 2.00Hz
F8-01	**Name**: Jog acceleration time **Setting range:** 0.1s ~ 6500.0s	**Default setting**: 20.00s
F8-02	**Name**: Jog deceleration time **Setting range:** 0.1s ~ 6500.0s	**Default setting**: 20.00s

It is used to define the reference frequency and ACC/DEC time of the inverter when jogging.

During Jog running, the start mode is fixed to direct start (F1-00=0), the stop mode is fixed to deceleration to stop (F1-10=0).

F8-03	**Name**: Acceleration time 2 **Setting range:** 0.1s ~ 6500.0s	**Default setting**: Model depend
F8-04	**Name**: Deceleration time 2 **Setting range:** 0.1s ~ 6500.0s	**Default setting**: Model depend
F8-05	**Name**: Acceleration time 3 **Setting range:** 0.1s ~ 6500.0s	**Default setting**: Model depend
F8-06	**Name**: Deceleration time 3 **Setting range:** 0.1s ~ 6500.0s	**Default setting**: Model depend
F8-07	**Name**: Acceleration time 4 **Setting range:** 0.1s ~ 6500.0s	**Default setting**: Model depend
F8-08	**Name**: Deceleration time 4 **Setting range:** 0.1s ~ 6500.0s	**Default setting**: Model depend

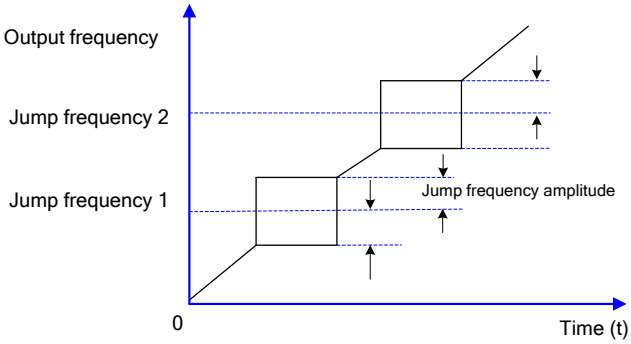
KD series inverter supplies 4 kinds of ACC/DEC time. The principles of them are the same. Please refer to description of F0-17 and F0-18 for more details.

User can select the one of 4 kinds ACC/DEC time thought the different combination of MI terminals. Please refer to the description of F5-00 ~ F5-04, then pay attention to Function (16) & Function (17).

F8-09	**Name**: Jump frequency 1	**Default setting**: 0.00Hz
	Setting range: 0.00Hz ~ F0-10 (maximum frequency)	
F8-10	**Name**: Jump frequency 2	**Default setting**: 0.00Hz
	Setting range: 0.00Hz ~ F0-10 (maximum frequency)	
F8-11	**Name**: Jump frequency amplitude	**Default setting**: 0.01Hz
	Setting range: 0.00Hz ~ F0-10 (maximum frequency)	

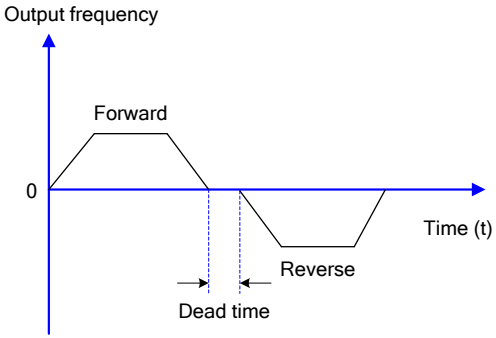
By means of setting jump frequency, the inverter can keep away from the mechanical resonance with the load. F8-09 and F8-10 are center value of frequency to be skipped.

If both F8-09 and F8-10 are 0, the jump frequency function is invalid, no matter what F8.11 is.



F8-12	**Name**: FWD/REV dead time	**Default setting**: 0.0s
	Setting range: 0.0s ~ 3000.0s	

FWD/REV dead time: to set the transition time at 0Hz point between forward running and reverse running.



F8-13 **Name**: Reverse control **Default setting**: 0

Setting range:

0: Enable

1: Disable

It is used to set whether the inverter can run reverse or not, if the application is not allowed the motor to run reverse, please set F8-13 to be 1.

F8-14 **Name**: Action when setting frequency lower than frequency lower limit **Default setting**: 0

Setting range:

0: Running at frequency lower limit

1: Stop

2: Zero-speed running

It is used to select the inverter running status when the setting frequency is lower than the frequency lower limit.

F8-15 **Name**: Droop control **Default setting**: 0.00Hz

Setting range: 0.00Hz ~ 10.00Hz

When several motors drive the same load, each motor's load is different because of the difference of motor's rated speed. The load of different motors can be balanced through droop control function which makes the speed droop along with load increase.

When the motor outputs rated torque, actual frequency drop is equal to F8-15. User can adjust this parameter from small to big gradually during commissioning.

F8-16 **Name**: Accumulated power-on arrival time **Default setting**: 0h

Setting range: 0h ~ 65000h

When the accumulated power on time (F7-13) reaches the value set by F8-16, the multifunctional digital terminal (24) outputs ON signal.

F8-17 **Name**: Accumulated running arrival time **Default setting**: 0h

Setting range: 0h ~ 65000h

It is used to set the running time of the inverter.

When the accumulated running time (F7-09) reaches the value set by F8-17, the multifunctional digital terminal (12) outputs ON signal.

F8-18 **Name**: Power-on running command valid protection selection **Default setting**: 0h

Setting range:

0: No protection

1: Protection

1). If power-on running command is valid (for example, the terminal running command is close before power on), the inverter will not response the running command. After the running command is removed & valid again, the inverter will response.

2). If the fault reset running command is valid, the inverter will not response the running commend, user must cancel the running command to remove the running protection status.

3). This code is set to 1 so as to avoid dangerous caused by that motor responses running command during power-on or fault reset.

F8-19 **Name**: Frequency detection value (FDT1) **Default setting**: 50.00Hz

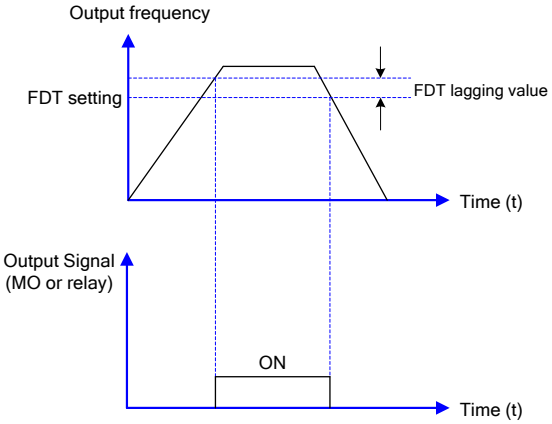
Setting range: 0.00Hz ~ F0-10 (maximum frequency)

F8-20 **Name**: Frequency detection lagging value (FDT1) **Default setting**: 5.0%

Setting range: 0.0% ~ 100.0% (F8-19)

When the output frequency reaches a certain preset frequency (FDT level), digital output terminal will output an ON signal until output frequency drops below a certain frequency of FDT level (FDT level - FDT lagging value), as shown in following figure.

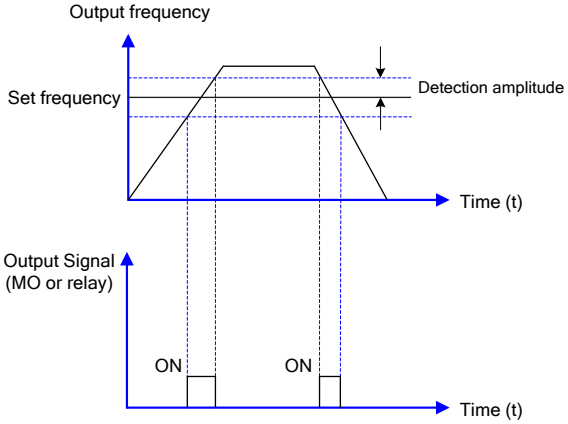
※ The lagging value of F8-20 is the percentage of F8-19.



F8-21 **Name**: Frequency arrival detection amplitude **Default setting**: 0.0%

Setting range: 0.0% ~ 100.0% (max. frequency)

When output frequency is within the detecting range of preset frequency, the digital output terminal will output an ON signal. The function can adjust the detecting range.



F8-22 **Name**: Jump frequency control during ACC/DEC **Default setting**: 0

Setting range:

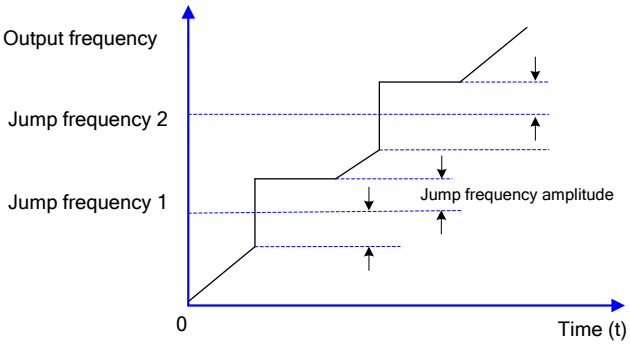
0: Invalid

1: Valid

It is used to set if jump frequency is valid during ACC/DEC.

While set it to be valid, and if the running frequency is in the range of jump frequency, the actual

running frequency will skip the boundary of the setting jump frequency.



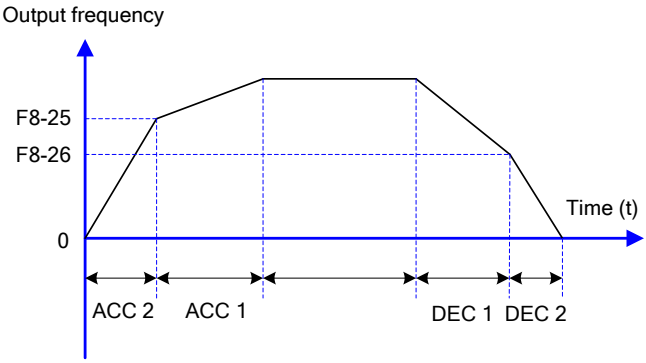
F8-25 **Name**: Acceleration time 1 and acceleration time 2 switching frequency point **Default setting**: 0.00Hz

Setting range: 0.00Hz ~ F0-10 (maximum frequency)

F8-25 **Name**: Deceleration time 1 and Deceleration time 2 switching frequency point **Default setting**: 0.00Hz

Setting range: 0.00Hz ~ F0-10 (maximum frequency)

This function is valid when don't use MI terminal to switch ACC/DEC. Suitable for the inverter running process, choose different ACC/DEC time according to the running frequency range (instead of through MI terminals).



During ACC, if the running frequency is lower than f8-25, then select ACC time 2, if the running

frequency is higher than F8-25, then select ACC time 1.

During DEC, if the running frequency is higher than F8-26, then select DEC time 1, if the running frequency is lower than F8-26, then select DEC time 2.

F8-27 **Name**: Terminal jog priority switching frequency point **Default setting**: 0

Setting range:

0: Invalid

1: Valid

It is used to set whether the terminal jog function is the highest priority.

When terminal jog priority is valid, if terminal jog command appears when running, the inverter switches to terminal jog running status.

F8-28 **Name**: Frequency detection value (FDT2) **Default setting**: 50.00Hz

Setting range: 0.00Hz ~ F0-10 (maximum frequency)

F8-29 **Name**: Frequency detection lagging value (FDT2) **Default setting**: 5.0%

Setting range: 0.0% ~ 100.0% (F8-28)

This frequency detection function is the same as FDT1, please refer to description of FDT1 (F8-19, F8-20).

F8-30 **Name**: Any arrival frequency detection value 1 **Default setting**: 50.00Hz

Setting range: 0.00Hz ~ F0-10 (maximum frequency)

F8-31 **Name**: Any arrival frequency detection amplitude 1 **Default setting**: 0.0%

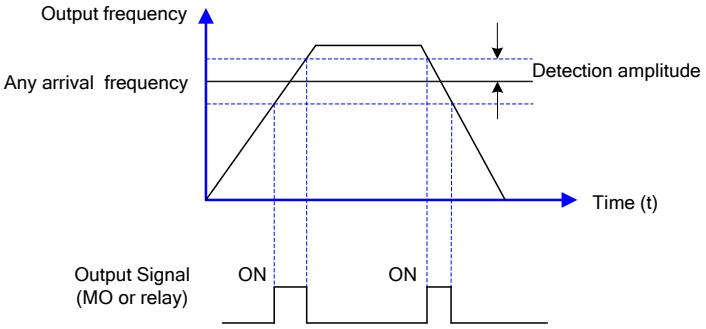
Setting range: 0.0% ~ 100.0% (maximum frequency)

F8-32 **Name**: Any arrival frequency detection value 2 **Default setting**: 50.00Hz

Setting range: 0.00Hz ~ F0-10 (maximum frequency)

F8-33 **Name**: Any arrival frequency detection amplitude 2 **Default setting**: 0.0%

Setting range: 0.0% ~ 100.0% (maximum frequency)



F8-34 **Name**: Zero-current detection level **Default setting**: 5.0%

Setting range:

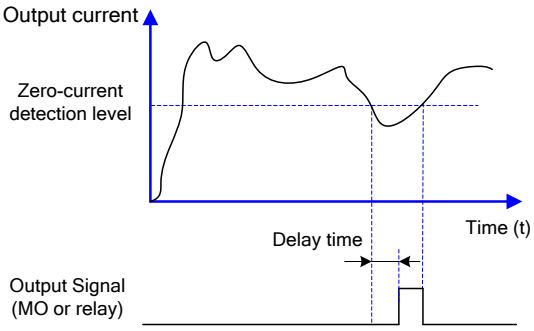
0.0% ~ 300.0%

※ 100.0% corresponds to motor rated current

F8-35 **Name**: Zero-current detection delay time **Default setting**: 0.10s

Setting range: 0.01s ~ 600.00s

When the output current ≤ zero current detection level, after the delay time, MO or relay terminal outputs ON signal.



F8-36 **Name**: Output current over limit value **Default setting**: 200.0%

Setting range:

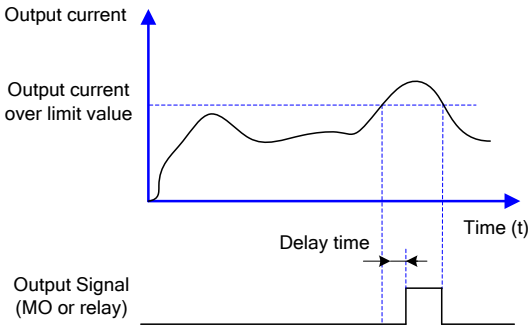
0.0% (No detection)

0.1% ~ 300.0% (motor rated current)

F8-37 **Name**: Output current over limit detection delay time **Default setting**: 0.10s

Setting range: 0.00s ~ 600.00s

When the output current is bigger than the over-limit value, after the delay time, MO or relay terminal outputs ON signal.



F8-38 **Name**: Any arrival current detection value 1 **Default setting**: 100.0%

Setting range: 0.0% ~ 300% (motor rated current)

F8-39 **Name**: Any arrival current detection amplitude 1 **Default setting**: 0.0%

Setting range: 0.0% ~ 300% (motor rated current)

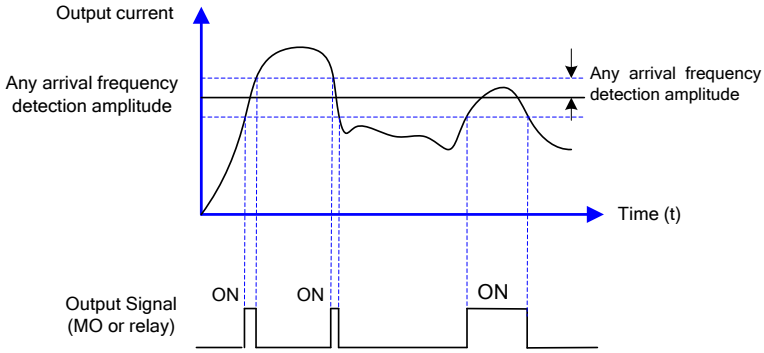
F8-40 **Name**: Any arrival current detection value 2 **Default setting**: 100.0%

Setting range: 0.0% ~ 300% (motor rated current)

F8-41 **Name**: Any arrival current detection amplitude 2 **Default setting**: 0.0%

Setting range: 0.0% ~ 300% (motor rated current)

When the output current fall in the range of positive or negative detection amplitude of the setting value (F8-38 and F8-40), MO or relay terminal outputs ON signal.



F8-42 **Name**: Timing function selection **Default setting**: 0

Setting range:

0: Invalid

1: Valid

F8-43 **Name**: Timing running duration source selection **Default setting**: 0

Setting range:

0: F8-44

1: VI

2: CI

3: Reserved

※ Analog input (VI and CI) scale corresponds to F8-44

F8-44 **Name**: Timing running duration **Default setting**: 0.00Min

Setting range: 0.0Min ~ 6500.0Min

The parameters are used to set the inverter timing running function.

When F8-42 timing function selection is valid, timing starts after the inverter starts, reaches the setting running time, the inverter stops automatically, meantime, MO or relay terminal (30) outputs ON signal.

Timing starts from 0 when the inverter starts, the remaining running time can be viewed via U0-20.

The timing running duration is set by F8-43, F8-44, time unit is minute.

F8-45 **Name**: VI input voltage protection lower limit **Default setting**: 3.10V

Setting range: 0.00V ~ F8-46

F8-46 **Name**: VI input voltage protection upper limit **Default setting**: 6.80V

Setting range: F8-45 ~ 10.00V

When the analog input VI value is bigger than F8-46, or smaller than F8-45, MO or relay terminal outputs “VI input over limit (31)” ON signal, used to indicate whether VI input voltage is in the setting range.

F8-47 **Name**: Module temperature arrival **Default setting**: 75℃

Setting range: 0℃ ~ 100℃

When the inverter radiator temperature reaches this value, MO or relay outputs “module temperature arrival (35)” ON signal.

F8-49 **Name**: Wake up frequency **Default setting**: 0.00Hz

Setting range: F8-51 (Dormancy frequency) ~ F0-10 (max. frequency)

F8-50 **Name**: Wake up delay time **Default setting**: 0.0s

Setting range: 0.0s ~ 6500.0s

F8-51 **Name**: Dormancy frequency **Default setting**: 0.00Hz

Setting range: 0.00Hz ~ F8-49 (wake up frequency)

F8-52 **Name**: Dormancy delay time **Default setting**: 0.0s

Setting range: 0.0s ~ 6500.0s

These parameters are used to achieve dormancy and wake up function in water-supply applications.

During running, when the setting frequency ≤ F8-51 dormancy frequency, after the delay time of F8-52, the inverter enters into dormancy status & stops automatically.

When the inverter is in the dormancy status & the present running command is valid, if the setting frequency ≥ F8-49, after the delay time of F8-50, the inverter starts (wake up).

Normally, please set wake up frequency ≥ dormancy frequency. Setting both wake up frequency and dormancy frequency are 0.00Hz, then wake up and dormancy functions are invalid.

When the dormancy and wake up function is valid, if frequency source is set by PID, if the inverter is under the dormancy status, F9-28 will affect whether the PID calculation is acted or not, in this condition, PID stop calculation function must be set to be 1 (F9-28=1).

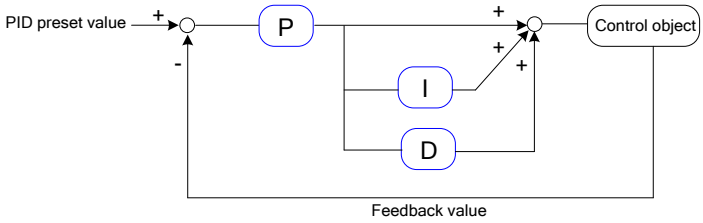
F8-53 **Name**: Running arrival time setting **Default setting**: 0.0Min

Setting range: 0.0Min ~ 6500.0Min

When the running time reaches the time set by F8-53, MO or relay outputs “Running arrival time setting (40)” ON signal.

Group F9 PID Function

PID control is a common used method in process control, such as flow, pressure and temperature control. The principle is firstly to detect the bias between preset value and feedback value, then calculate output frequency of inverter according to proportional gain, integral and differential time. Please refer to following figure.



F9-00 **Name**: PID given source **Default setting**: 0

Setting range:

0: F9-01

1: VI

2: CI

3: Reserved

4: Reserved

5: Communication

6: Multi-step command

F9-01 **Name**: PID given through keypad **Default setting**: 50.0%

Setting range:

0.0%~100%

F9-00 is used to select the given channel of PID target value, when F0-03=8, this function is valid. The parameter determines the target given channel during the PID procures.

Note:

- Preset value and feedback value of PID are percentage value.
- 100% of preset value is corresponding to 100% of feedback value.
- PID given source and feedback source cannot be the same, otherwise, PID cannot control effectively.

F9-02 **Name**: PID feedback source **Default setting**: 0

Setting range:

0: VI

1: CI

2: Reserved
3: Reserved
4: Reserved
5: Communication
6: VI+CI
7: MAX (|VI|, |CI|)
8: MIN (|VI|, |CI|)

This parameter is used to select PID feedback source.
As it mentioned above, the given channel and the feedback channel cannot be the same, otherwise, PID cannot control effectively.

F9-03 **Name**: PID action direction **Default setting**: 0

Setting range:
0: Positive
1: Negative

0: Positive. When the feedback value is greater than the pre-set value, output frequency will be decreased, such as tension control in winding application.
1: Negative. When the feedback value is greater than the pre-set value, output frequency will be increased, such as tension control in unwinding application.

F9-04 **Name**: PID given feedback range **Default setting**: 1000

Setting range: 0~65535

PID given feedback range is a non-dimensional unit. It is used to display the given value of U0-15 and feedback value of U0-16.

The PID given feedback is a percentage value, for example, if we set F9-04 to be 2000, when the PID given value is 100%, the display value of U0-15 is 2000.

F9-05 **Name**: Proportional gain Kp1 **Default setting**: 20.0

Setting range: 0.0~100.0

F9-06 **Name**: Integration time Ti1 **Default setting**: 2.00s

Setting range: 0.01s ~ 10.00s

F9-07 **Name**: Differential time Td1 **Default setting**: 0.000s

Setting range: 0.000s ~ 10.000s

Proportional gain Kp1:

It decides the adjustment intensity of the whole PID regulator. The higher the K_p1 is, the stronger the adjustment intensity is. When this parameter is 100, indicating the deviation between PID feedback value and given value is 100%, the adjustment amplitude of the PID regulator on the output frequency command is maximum frequency.

Integration time Ti1:

It decides the intensity of the integration adjustment of PID regulator. The shorter the integration time is, the stronger the adjustment intensity is. Integration time is the time within which the adjustment value reaches maximum frequency when the deviation between PID feedback value and given value is 100%.

Differential time Td1:

It decides the intensity of the deviation change rate of PID regulator. The longer the differential time is, the stronger the adjustment intensity is. Differential time is the time within which if the feedback value changes 100%, the adjustment value reaches maximum frequency.

F9-08 **Name**: Cutoff frequency of PID reverse **Default setting**: 0.00Hz

Setting range: 0.00 ~ F0-10 (maximum frequency)

In some conditions, only when PID output frequency is negative (inverter reverse), PID can make given value and feedback value in a same status. But the reverse frequency cannot be too high for some applications. The reverse frequency upper limit is determined by F9-08.

F9-09 **Name**: PID deviation limit **Default setting**: 0.0%

Setting range: 0.0% ~ 100.0%

When the deviation between PID given value and feedback value is smaller than F9-09, PID stops adjustment. The output frequency is stable when the deviation is small, which is suitable for some close loop control applications.

F9-10 **Name**: PID differential amplitude **Default setting**: 0.10%

Setting range: 0.00% ~ 100.00%

In the PID control processing, the differential adjustment is very sensitive, it is easy to cause the system into oscillation. For this reason, we usually limit the PID differential adjustment into a small range; F9-10 is used to set the output range of differential value.

F9-11 **Name**: PID given filter time **Default setting**: 0.00s

Setting range: 0.00 ~ 650.00s

F9-11 is to set the time of PID given value changes from 0.0% to 100.0%.

When PID given is changing, PID given value linearly changes according to the given filter time, so as to reduce the adverse effect of the system caused by the sudden change of given value.

F9-12	**Name**: PID feedback filter time **Setting range:** 0.00 ~ 60.00s	**Default setting**: 0.00s
F9-13	**Name**: PID output filter time **Setting range:** 0.00 ~ 60.00s	**Default setting**: 0.00s

F9-12 is used to filter the PID feedback value; this filter can improve anti-interference capability of feedback value, but it will affect the response performance.

F9-13 is used to filter the PID output frequency; this filter will reduce the sudden change of the output frequency, but it will also affect the response performance.

F9-15	**Name**: Proportional gain Kp2 **Setting range:** 0.0~100.0	**Default setting**: 20.0
F9-16	**Name**: Integration time Ti2 **Setting range:** 0.01s ~ 10.00s	**Default setting**: 2.00s
F9-17	**Name**: Differential time Td2 **Setting range:** 0.000s ~ 10.000s	**Default setting**: 0.000s
F9-18	**Name**: PID parameters switching condition **Setting range:** 0: No switching 1: Switching via MIn terminals 2: Automatic switching according to the deviation	**Default setting**: 0
F9-19	**Name**: PID parameter switching deviation 1 **Setting range:** 0.0% ~ F9-20	**Default setting**: 20.0%
F9-20	**Name**: PID parameter switching deviation 2 **Setting range:** F9-19 ~ 100.0%	**Default setting**: 80.0%

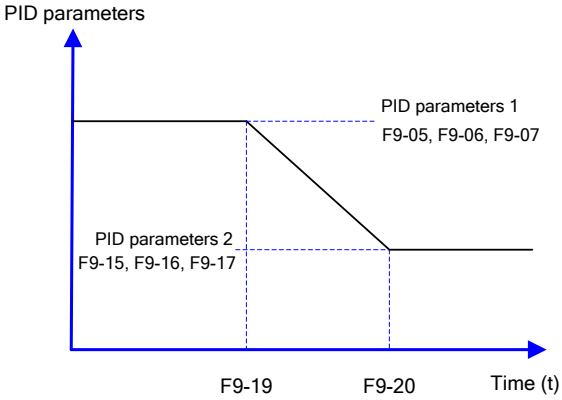
In some applications, one group PID parameter is not enough, different PID parameters would be adopted according to the situation.

The function codes are used to switch two groups PID parameter. The setting mode of the regulator parameters F9-15 ~ F9-17 are similar as F9-05 ~ F9-07.

Two groups PID parameter can be switched via DI terminal, or switched according to PID

deviation automatically.

When selection is automatic switching: when the deviation absolute value between given and feedback is smaller than F9-19 (PID parameter switching deviation 1), PID parameter selection is group 1. When the deviation absolute value between given and feedback is bigger than F9-20 (PID parameter switching deviation 2), PID parameter selection is group 2. When the deviation absolute value between given and feedback is between F919 and F9-20, PID parameter is the linear interpolation of two groups PID parameter, showed as below figure.



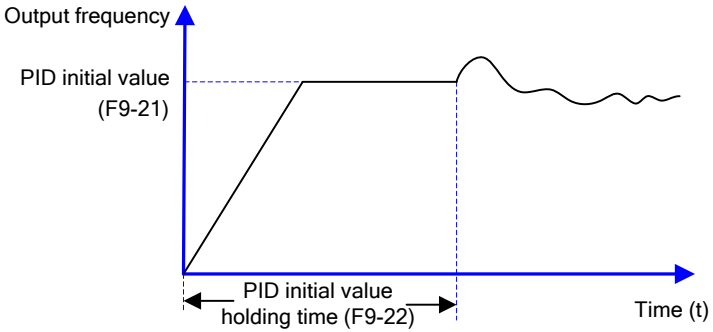
F9-21 **Name**: PID initial value **Default setting**: 0.0%

Setting range: 0.0% ~ 100.0%

F9-22 **Name**: PID initial value holding time **Default setting**: 0.00s

Setting range: 0.00 ~ 650.00s

When starting, PID output is PID initial value (F9-21); after the initial value holding time (F9-22), PID starts the output calculating. The function of PID initial value is shown as below diagram:



F9-23 **Name**: Forward maximum value between two output deviation **Default setting**: 1.00%

Setting range: 0.00% ~ 100.00%

F9-24 **Name**: Reverse maximum value between two output deviation **Default setting**: 1.00%

Setting range: 0.00% ~ 100.00%

This function is used to limit the difference between PID output two bats (2ms/bat), so as to against PID output changing too fast, make the inverter runs stably.

F9-23 and F9-24 correspond to the maximum of the output deviation absolute value when forward and reverse, respectively.

F9-25 **Name**: PID integration attribute **Default setting**: 00

Setting range:

- Units place: Integration separation

0: Invalid

1: Valid

- Tens place: Stop integrating or not after output reaching the limitation value

0: Keep integrating

1: Stop integrating

Integration separation:

If integration separation is valid, when multifunctional digital MIn integration pause (function 22) is valid, PID integration stop calculating, PID is only valid when proportional and differential action.

When integration separation is invalid, whatever multifunctional digital DI is valid or not, integration separation is invalid.

Stop integrating or not after output reaching the limitation value:

After PID calculation output reaches the maximum or minimum, whether stop integral action or not can be selected. If the selection is stop integrating, PID integration will stop calculating, which may help to reduce PID overshoot.

F9-26 **Name**: PID feedback lost detection value **Default setting**: 0.0%

Setting range:

0.0%: No judgment for feedback lost

0.1% ~ 100.0%

F9-27 **Name**: PID feedback lost detection time **Default setting**: 0.0s

Setting range: 0.0s ~ 20.0s

The parameters are used to check whether PID feedback is lost.

When PID feedback is smaller than feedback lost detection value (F9-26), after the PID feedback lost detection time (F9-27), the inverter alarms fault Err31, and make the action according to the chosen fault process mode.

F9-28 **Name**: PID stops calculation **Default setting**: 0

Setting range:

0: No calculation when stop

1: Calculation when stop

This parameter is used to select PID stop status & whether PID continues calculating or not. For normal applications, PID should stop calculating when stop.

Group FA Fault and Protection

FA-00 **Name**: Motor overload protection selection **Default setting**: 1

Setting range:

0: Disable

1: Enable

FA-01 **Name**: Motor overload protect gain **Default setting**: 1.00

Setting range: 0.20 ~ 10.00

FA-00=0: Has no motor overload protection function, may cause the motor overheating damaged, it is suggested to add a thermal relay between the inverter and motor.

FA00=1: The inverter judges whether the motor is overload or not according to the inverse time limit curve of motor overload protection.

The inverse time limit curve of motor overload protection: 220%×(FA-01)×motor rated current, lasts for one minute, the overload fault would be reported; 150%×(FA-01)×motor rated current, lasts for 60 minutes, the overload fault would be reported.

Please set FA-01 according to the motor overload ability. If the parameter is too big, the motor will be damaged by over heat but without fault alarming.

FA-02 **Name**: Motor overload pre-alarm coefficient **Default setting**: 80%

Setting range: 50% ~ 100%

For safe consideration, there is a pre-warming signal sent to the control system via MO terminal before the motor overload happen, the pre-warming coefficient is used to define the extent of pre-warming value before the motor overload protection. The bigger the parameter is, the smaller the pre-warming lead is.

After the accumulated output current is bigger than (FA-02)*overload inverse time limit curve, MO terminal outputs “motor overload pre-warming” ON signal.

FA-03 **Name**: Stall over-voltage gain **Default setting**: model depend

Setting range: 0 ~ 100

FA-04 **Name**: Stall over-voltage point / Braking threshold **Default setting**: 135%

Setting range: 120% ~ 150%

During deceleration, while the DC bus voltage exceeds over-voltage stall protection voltage, the inverter stops deceleration & stays at the current frequency; and after the DC bus voltage drops, it continues decelerating.

Over-voltage stall gain is used to adjust the suppression over-voltage capacity during

deceleration. The bigger this value is, the stronger the capacity is. Under the precondition of no over-voltage, please set the gain as small as possible.

For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with big inertia, the value should be big. Otherwise, the suppression result will be poor, and over voltage fault may occur.

When the value is 0, the over voltage stall function is invalid.

FA-05 **Name**: Stall over current gain **Default setting**: 30

Setting range: 0 ~ 100

FA-06 **Name**: Stall over current point **Default setting**: 170%

Setting range: 100% ~ 200%

During the inverter ACC/DEC, when the output current exceeds over-current stall protection current, the inverter stops ACC/DEC, runs with the current frequency, continue ACC/DEC after the output current is reduced.

Over-current stall gain is used to adjust the suppression over-current capacity during ACC/DEC. The bigger this value is, the stronger the capacity is. Under the precondition of no over-current, please set the gain as small as possible.

For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with big inertia, the value should be big. Otherwise, the suppression result will be poor, and over-current fault may occur.

When the value is 0, the over-voltage stall function is invalid.

FA-07 **Name**: Short-circuit to ground protection selection when power-on **Default setting**: 1

Setting range:

0: Invalid

1: Valid

It is used to check whether the motor is short circuit to ground when the inverter is power on.

※ If the function is valid, the inverter U, V, W terminals have output voltage after power on for a while.

FA-09 **Name**: Fault auto-reset times **Default setting**: 0

Setting range: 0 ~ 20

While the fault happens in running process, the inverter stops its output; then performs auto fault reset and continues running after the auto-reset interval defined by FA-11.

FA-09 is used to set fault auto reset times. After this value is exceeded, the inverter will keep at

fault status. When the fault auto reset time is setup to 0, there is no auto-reset function, and only manual reset can be done.

FA-10 **Name**: MO output selection during fault auto-reset **Default setting**: 1

Setting range:

0: No action

1: Action

If fault auto-reset function is valid, during fault auto-resetting, whether MO output is activated or not is defined by FA-10.

FA-11 **Name**: Fault auto-reset interval **Default setting**: 0.1s

Setting range: 0.1s ~ 100.0s

The waiting time of the inverter from the fault alarm to auto-reset.

FA-13 **Name**: Output phase failure protection selection **Default setting**: 1

Setting range:

0: Disable

1: Enable

Select to protect output phase failure or not.

FA-14 **Name**: The first fault type **Default setting**: -

FA-15 **Name**: The second fault type **Default setting**: -

FA-16 **Name**: The third (latest) fault type **Default setting**: -

Setting range: 0 ~ 99

It is used to record the last three times fault types: 0 means no fault, please refer to Chapter 7 for solutions.

FA-17 **Name**: Frequency at the third (latest) fault **Default setting**: -

Setting range:

FA-18 **Name**: Current at the third (latest) fault **Default setting**: -

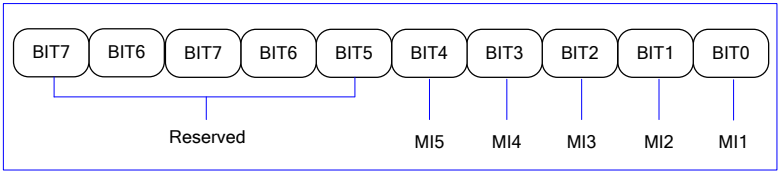
Setting range:

FA-19 **Name**: DC bus voltage at the third (latest) fault **Default setting**: -

Setting range:

FA-20 **Name**: Input terminal's status at the third (latest) fault **Default setting**: -

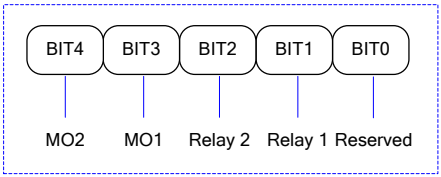
Setting range:



The last fault type output terminal status, sequence: when the input terminal is ON, the corresponding binary bit is 1, when the input terminal is OFF; the corresponding binary bit is 0. All the MI statuses are displayed as decimal numbers.

FA-21 **Name**: Output terminal's status at the third (latest) fault **Default setting**: -

Setting range:



The last fault type output terminal status, sequence: when the input terminal is ON, the corresponding binary bit is 1, when the input terminal is OFF; the corresponding binary bit is 0. All the digital output terminals' statuses are displayed as decimal numbers.

FA-22 **Name**: Inverter status at the third (latest) fault **Default setting**: -

Setting range: Reserved

FA-23 **Name**: Power-on time at the third (latest) fault **Default setting**: -

Setting range: -

The latest fault power-on time

FA-24 **Name**: Running time at the third (latest) fault **Default setting**: -

Setting range: Reserved

The latest fault running time

FA-27 **Name: Frequency at the second fault** **Default setting: -**

Setting range: -

FA-28	**Name**: Current at the second fault **Setting range: -**	**Default setting**: -
FA-29	**Name**: DC bus voltage at the second fault **Setting range: -**	**Default setting**: -
FA-30	**Name**: Input terminal's status at the second fault **Setting range: -**	**Default setting**: -
FA-31	**Name**: Output terminal's status at the second fault **Setting range:**	**Default setting**: -
FA-32	**Name**: Inverter status at the second fault **Setting range:** Reserved	**Default setting**: -
FA-33	**Name**: Power-on time at the second fault **Setting range: -** The second fault power-on time	**Default setting**: -
FA-34	**Name**: Running time at the second fault **Setting range:** Reserved The second fault running time ※ Parameters of FA-27 ~ FA-34 are related information of the second time fault, same as FA-17 ~ FA-24.	**Default setting**: -
FA-37	**Name**: Frequency at the first fault **Setting range: -**	**Default setting**: -
FA-38	**Name**: Current at the first fault **Setting range: -**	**Default setting**: -
FA-39	**Name**: DC bus voltage at the first fault **Setting range: -**	**Default setting**: -
FA-40	**Name**: Input terminal's status at the firs fault **Setting range: -**	**Default setting**: -

FA-41 **Name**: Output terminal's status at the first fault **Default setting**: -

Setting range:

FA-42 **Name**: Inverter status at the first fault **Default setting**: -

Setting range: Reserved

FA-43 **Name**: Power-on time at the first fault **Default setting**: -

Setting range: -

The first fault power-on time

FA-44 **Name**: Running time at the first fault **Default setting**: -

Setting range:

The first fault running time

※ Parameters of FA-37 ~ FA-44 are related information of the first time fault, same as FA-17 ~ FA-24.

FA-59 **Name**: Instantaneous power-off action selection **Default setting**: 0

Setting range:

0: Invalid
1: Deceleration
2: Deceleration-to-stop

FA-60 **Name**: Instantaneous power-off deceleration frequency switching point **Default setting**: 0.0%

Setting range: 0.0% ~ 100.0%

FA-61 **Name**: Recover judgment time when Instantaneous power-off **Default setting**: 0.50s

Setting range: 0.00s ~ 100.00s

FA-62 **Name**: Recover judgment voltage when Instantaneous power-off **Default setting**: 80.0%

Setting range: 60.0% ~ 100.0% (standard DC bus voltage)

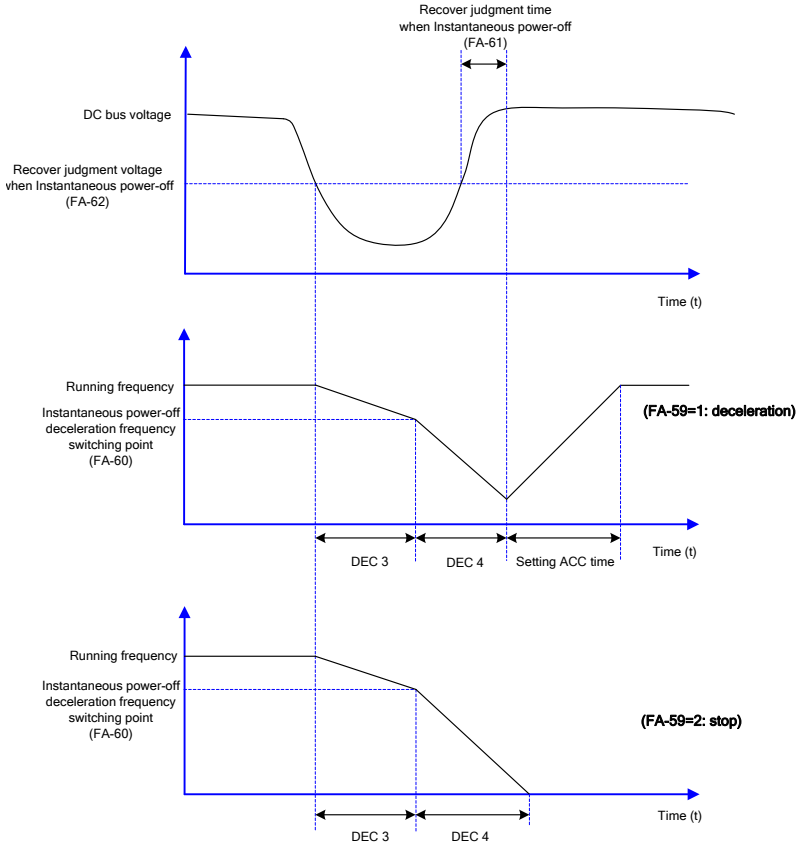
The function is that, when instantaneous power off or voltage drops suddenly, the inverter will reduce output speed to decrease compensation voltage for DC bus which is generated by the

load feedback energy, so that keep the inverter running.

FA-59=1: When instantaneous power off or voltage drops suddenly, the inverter decelerates, when bus voltage returns to normal, the inverter accelerates to the setting frequency and runs. Normal bus voltage lasts for longer than the time set by FA-61 means that bus voltage returns to normal.

FA-59=2: When instantaneous power off or voltage drops suddenly, the inverter decelerates to stop.

For detailed control logic, please refer to the below diagram.



FA-63 **Name**: Off-load protection selection **Default setting**: 0

Setting range:

0: Disable

1: Enable

FA-64 **Name**: Off-load detection level **Default setting**: 10.0%

Setting range: 0.0% ~ 100.0%

FA-65 **Name**: Off-load detection time **Default setting**: 1.0s

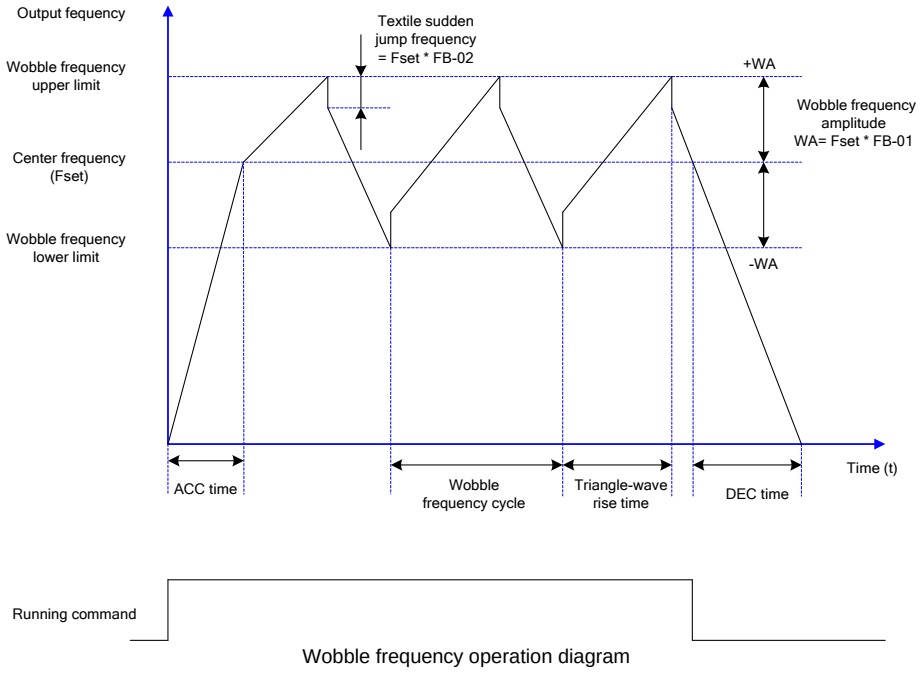
Setting range: 0.0 ~ 60.0s

If off-load protection function is valid, when the output current is smaller than off-load detection level FA-64, and the duration time is longer than off-load detection time FA-65, the output frequency will reduce to 7% of the rated frequency automatically. During off-load protection, if load recovers, the inverter will recover and run with the setting frequency automatically.

Group FB Wobble Frequency, Fixed Length & Counting

The wobble frequency function is suitable for textile, chemical fiber industries, and the applications which require traversing and winding functions.

The wobble frequency function means that the output frequency of the inverter wobbles up and down with the setting frequency as the center. The trace of running frequency at the time axis is shown in the figure below, of which the wobble amplitude is set by FB-00 and PB-01. When FB-01 is set to 0, indicating the wobble amplitude is 0, the wobble frequency is disabled.



Wobble frequency operation diagram

FB-00 **Name**: Wobble frequency setting mode **Default setting**: 0

Setting range:

0: Relative to center frequency

1: Relative to maximum frequency

This parameter is used to select the reference value of the wobble amplitude.

0: Relative to the center frequency (F0-07: frequency source selection), and it is variable wobble amplitude system. The wobble amplitude changes with the center frequency (setting frequency).

1: Relative to the maximum frequency (F0-10) and it is fixed wobble amplitude system. The wobble amplitude is fixed.

FB-01 **Name**: Wobble frequency amplitude (WA) **Default setting**: 0.0%

Setting range: 0.0% ~ 100.0%

FB-02 **Name**: Sudden Jump frequency amplitude **Default setting**: 0.0%

Setting range: 0.0% ~ 50.0%

This parameter is used to determine the values of wobble amplitude and sudden jump frequency. The wobble frequency is limited by the frequency upper limit and frequency lower limit.

The wobble amplitude is relative to the central frequency (variable wobble amplitude, select FB-00=0): wobble amplitude: WA= F0-07 × FB-01.

The wobble amplitude is relative to the maximum frequency (fixed wobble amplitude, select FB-00=1): wobble amplitude: WA= F0-10 × FB-01.

Sudden jump frequency= WA × FB-02. That is the value of sudden jump frequency relative to the wobble amplitude when the wobble frequency is running.

If the wobble amplitude relative to the central frequency (variable wobble amplitude, select FB-00=0) is selected, the sudden jump frequency is a variable value.

If the wobble amplitude relative to the maximum frequency (fixed wobble amplitude, select FB-00=1) is selected, the sudden jump frequency is a fixed value.

FB-03 **Name**: Wobble frequency cycle **Default setting**: 10.0s

Setting range: 0.1s ~ 3000.0s

FB-04 **Name**: Triangle wave rise time coefficient **Default setting**: 50.0%

Setting range: 0.1% ~ 100.0%

Wobble frequency cycle: It refers to the time of a complete cycle of wobble frequency.

FB-04 is relative to the percentage of FB-03.

Triangle wave rise time = FB-03 × FB-04, the unit is second (s)

Triangle wave fall time = FB-03 × (1- FB-04), the unit is second (s)

FB-05 **Name**: Setting length **Default setting**: 1000m

Setting range: 0m ~ 65535m

FB-06 **Name**: Actual length **Default setting**: 0m

Setting range: 0m ~ 65535m

FB-07 **Name**: Number of pulse per meter **Default setting**: 100.0

Setting range: 0.0 ~ 6553.5

The parameters are used in fixed length control.

Length information can be collected via input terminals, FB-06= the collected number of pulses/FB-07. When FB-06 is longer than FB-05, MO or relay output “length arrival” signal.

During fixed length control, length reset operation can be done by set MI terminal function to 28, refers to F5-00 ~ F5-04 for details.

The relative input terminal (MI) function need to be set to 27 (length counting input) for applications, MI5 must be used when the pulse frequency is high.

FB-08 **Name**: Setting count value **Default setting**: 1000

Setting range: 1 ~ 65535

FB-09 **Name**: Designated count value **Default setting**: 1000

Setting range: 1 ~ 65535

The count value is collected via digital input terminals. The relative input terminal function need to be set to 25 (Counter input) for applications, MI5 must be used when the pulse frequency is high.

When the counting value reaches FB-08, MO or relay outputs “setting counting value arrival” signal, then the counter will stop counting.

When the counting value reaches FB-09, MO or relay outputs “designated counting value” signal. The counter will continue counting till the “setting count value” is reached.

※ FB-09 should not exceed FB-08.

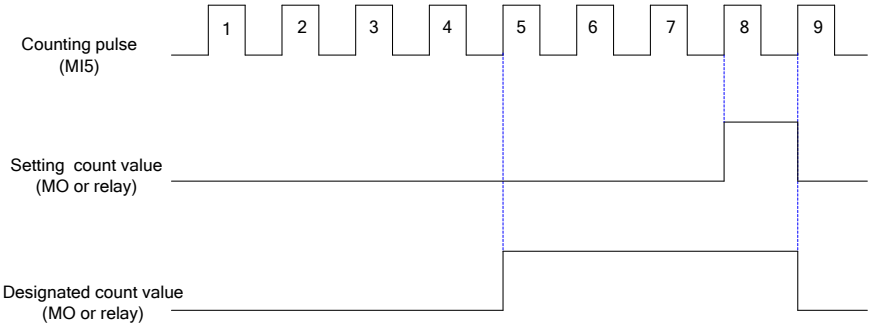


Diagram of counting function

Group FC Communication Parameters

FC-00 **Name**: Baud rate **Default setting**: 6005

Setting range:

- Unit place: Modbus

0: 300BPS
1: 600BPS
2: 1200BPS
3: 2400BPS
4: 4800BPS
5: 9600BPS
6: 19200BPS
7: 38400BPS
8: 57600BPS
9: 115200BPS

- Tens place: Reserved
- Hundred place: Reserved
- Thousand place: Reserved

This parameter can set the data transmission rate during serial communication.

The baud rate between the upper monitor and the inverter must be the same. Otherwise, the communication is not applied. The bigger the baud rate, the quicker the communication speed.

FC-01 **Name**: Data format **Default setting**: 0

Setting range:

0: No parity check (8-N-2)
1: Even parity check (8-E-1)
2: Odd parity check (8-O-1)
3: No parity check (8-N-1)

This parameter defines the data format used in serial communication protocol.

0: RTU, 1 start bit, 8 data bits, no parity check, 2 stop bit.

1: RTU, 1 start bit, 8 data bits, even parity check, 1 stop bit.

2: RTU, 1 start bit, 8 data bits, odd parity check, 1 stop bit.

3: RTU, 1 start bit, 8 data bits, no parity check, 1 stop bit.

FC-02 **Name**: Inverter address **Default setting**: 1

Setting range: 0 ~ 249

This parameter determines the slave (inverter) address used for communication with master. The

value “0” is the broadcast address.

FC-03 **Name**: Communication delay time **Default setting**: 2ms

Setting range: 0ms ~ 20ms

This parameter means the interval time when the drive receive the data and sent it to the upper monitor. If the answer delay is shorter than the system processing time, then the answer delay time is the system processing time, if the answer delay is longer than the system processing time, then after the system deal with the data, waits until achieving the answer delay time to send the data to the upper monitor.

FC-04 **Name**: Communication timeout delay **Default setting**: 0.0

Setting range:

0.0 (invalid)

0.1s ~ 60.0s

When the function code is set as 0.0, the communication overtime parameter is invalid.

When the function code is set to a valid value, if the interval time between two communications exceeds the communication overtime, the system will report “communication faults” (Err16).

Generally, set it as invalid; set the parameter in the continuous communication system, to monitor the communication state.

FC-05 **Name**: Communication protocol selection **Default setting**: 0.0

Setting range:

- Unit place: Modbus

0: Non-standard MODBUS protocol

1: Standard MODBUS protocol

- Tens place: Reserved

Please refer to chapter 9 for details.

FC-06 **Name**: Communication read current resolution **Default setting**: 0

Setting range:

0: 0.01A

1: 0.1A

This parameter is used to define the resolution when reading the inverter output current.

Group FD Multi-step Command and Simple PLC

Simple PLC function can enable the inverter to change its output frequency and directions automatically according to programmable values. It can achieve the simple combination of running frequency and time.

For multi-step speed function, the output frequency can be changed only by multi-step terminals.

FD-00 **Name**: Multi-step speed 0 **Default setting**: 0.0%

FD-01 **Name**: Multi-step speed 1 **Default setting**: 0.0%

FD-02 **Name**: Multi-step speed 2 **Default setting**: 0.0%

FD-03 **Name**: Multi-step speed 3 **Default setting**: 0.0%

FD-04 **Name**: Multi-step speed 4 **Default setting**: 0.0%

FD-05 **Name**: Multi-step speed 5 **Default setting**: 0.0%

FD-06 **Name**: Multi-step speed 6 **Default setting**: 0.0%

FD-07 **Name**: Multi-step speed 7 **Default setting**: 0.0%

FD-08 **Name**: Multi-step speed 8 **Default setting**: 0.0%

FD-09 **Name**: Multi-step speed 9 **Default setting**: 0.0%

FD-10 **Name**: Multi-step speed 10 **Default setting**: 0.0%

FD-11 **Name**: Multi-step speed 11 **Default setting**: 0.0%

FD-12 **Name**: Multi-step speed 12 **Default setting**: 0.0%

FD-13 **Name**: Multi-step speed 13 **Default setting**: 0.0%

FD-14 **Name**: Multi-step speed 14 **Default setting**: 0.0%

FD-15 **Name**: Multi-step speed 15 **Default setting**: 0.0%

Setting range: -100.0% ~ 100.0%

Multi-step command can be used in three situations: frequency source, voltage source of V/f separation function and the setting source of the PID.

Under these three situations, the dimension of the multi-step command is the relative value, range -100.0%~100.0%.

When it is used as the frequency source, it is the percentage of the maximum frequency,

When it is used as the voltage source of V/f separation function, it is the percentage of motor rated voltage.

When it is used as the PID setting source, the value of percentage is the same like PID setting.

.Multi-step speeds selections are based on the different combination status of multifunctional digital MIn, please refer to F4 group for details.

FD-16 **Name**: Simple PLC running mode **Default setting**: 0

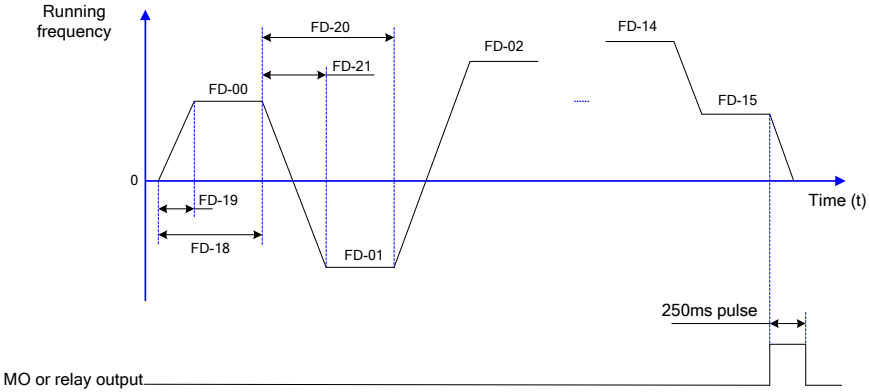
Setting range:

0: Stop after one cycle

1: Keep last frequency after one cycle

2: Circular running

When frequency source is set by simple PLC, the positive and negative values of FD-00 ~ FD-15 determine the running direction, the inverter run reverse if they are negative values.



Simple PLC running diagram

0: Stop after one cycle:

Inverter stops automatically as soon as it completes one cycle, and It needs run command to start again.

1: keep last frequency after one cycle:

Inverter holds frequency and direction of last phase after one cycle.

2: Circular running:

Inverter continues to run cycle by cycle until receive a stop command.

FD-16 **Name**: Simple PLC status memory selection **Default setting**: 00

Setting range:

- Units place: memory selection when power-off

0: Not memory

1: Memory

- Tens place: memory selection when stop

0: Not memory

1: Memory

Simple PLC memory when power-off means the last PLC running step and running frequency are memorized before power-off, keep running from the memory status after power-on next time.

When selection is “not memory”, it will restart PLC process after power-on each time.

"PLC memory when stop" means the last PLC running step and running frequency are memorized when stopping, keep running with the memory status after power-on next time. When selection is "not memory", it will restart PLC process after start each time.

FD-18	**Name**: 0th step running time	**Default setting**: 0.0s (h)
FD-20	**Name**: 1th step running time	**Default setting**: 0.0s (h)
FD-22	**Name**: 2th step running time	**Default setting**: 0.0s (h)
FD-24	**Name**: 3th step running time	**Default setting**: 0.0s (h)
FD-26	**Name**: 4th step running time	**Default setting**: 0.0s (h)
FD-28	**Name**: 5th step running time	**Default setting**: 0.0s (h)
FD-30	**Name**: 6th step running time	**Default setting**: 0.0s (h)
FD-32	**Name**: 7th step running time	**Default setting**: 0.0s (h)
FD-34	**Name**: 8th step running time	**Default setting**: 0.0s (h)
FD-36	**Name**: 9th step running time	**Default setting**: 0.0s (h)
FD-38	**Name**: 10th step running time	**Default setting**: 0.0s (h)
FD-40	**Name**: 11th step running time	**Default setting**: 0.0s (h)
FD-42	**Name**: 12th step running time	**Default setting**: 0.0s (h)
FD-44	**Name**: 13th step running time	**Default setting**: 0.0s (h)
FD-46	**Name**: 14th step running time	**Default setting**: 0.0s (h)
FD-48	**Name**: 15th step running time	**Default setting**: 0.0s (h)

Setting range: 0.0s (h) ~ 6500.0s (h)

To set the running time for each step, the time unit is set by FD-50.

FD-19	**Name**: 0th step ACC/DEC time	**Default setting**: 0
FD-21	**Name**: 1th step ACC/DEC time	**Default setting**: 0
FD-23	**Name**: 2th step ACC/DEC time	**Default setting**: 0
FD-25	**Name**: 3th step ACC/DEC time	**Default setting**: 0
FD-27	**Name**: 4th step ACC/DEC time	**Default setting**: 0
FD-29	**Name**: 5th step ACC/DEC time	**Default setting**: 0
FD-31	**Name**: 6th step ACC/DEC time	**Default setting**: 0
FD-33	**Name**: 7th step ACC/DEC time	**Default setting**: 0
FD-35	**Name**: 8th step ACC/DEC time	**Default setting**: 0
FD-37	**Name**: 9th step ACC/DEC time	**Default setting**: 0
FD-39	**Name**: 10th step ACC/DEC time	**Default setting**: 0
FD-41	**Name**: 11th step ACC/DEC time	**Default setting**: 0
FD-43	**Name**: 12th step ACC/DEC time	**Default setting**: 0
FD-45	**Name**: 13th step ACC/DEC time	**Default setting**: 0
FD-47	**Name**: 14th step ACC/DEC time	**Default setting**: 0
FD-49	**Name**: 15th step ACC/DEC time	**Default setting**: 0

Setting range: 0 ~ 3

To set the ACC/DEC time for each step, the setting value 0~3 correspond to ACC/DEC time 1~4, please refer to F0-17~F0-18, F8-03~F8-08 for details.

FD-50 **Name**: Timing unit (Simple PLC mode) **Default setting**: 0

Setting range:

0: s (second)

1: h (hour)

To set the timing unit of simple PLC running,

FD-51 **Name**: Multi-step speed 0 given channel **Default setting**: 0

Setting range:

0: FD-00

1: VI

2: CI

3: Keypad potentiometer

4: Reserved

5: PID control

6: Keypad setting frequency (F0-08), can be modified via UP/DN

The given channel of multi-step command 0 is determined by this parameter.

Multi-step command 0 has many selections besides FD-00, which is conveniently for switching between multi-step command and other given modes. When the frequency source is set by multi-step speed or simple PLC, it can achieve the switching between two frequency sources easily.

Group FE Torque Control & Optimized Parameters

FE-00 **Name**: Speed/torque control mode selection **Default setting**: 0

Setting range:

0: Speed control

1: Torque control

It is used to select the inverter control mode: speed control or torque control.

F0-01 (control mode) must be set to 0 (SVC) if you need to use torque control.

Multifunctional digital MI terminal has two functions related with torque control: torque control prohibits (function 29), speed control/torque control switching (function 46). The two terminals need to be matched up with FE-00 to switch speed control and torque control.

When speed control/torque control switching terminal is invalid, the control mode is determined by FE-00. When speed control/torque control switching terminal is valid, the control mode is determined by the reverse value of FE-00.

When torque control prohibit terminal is valid, the control mode is speed control.

FE-01 **Name**: Torque setting source selection in torque control mode **Default setting**: 0

Setting range:

0: Reserved

1: VI

2: CI

3: Reserved

4: Reserved

5: Communication

6: Min (VI, CI)

7: Max (VI, CI)

FE-03 **Name**: Torque setting through keypad in torque control mode **Default setting**: 150%

Setting range: -200.0% ~ 200.0%

FE-01 is used to select the torque setting source.

Torque setting adopts relative value, 100.0% corresponds to the rated torque, range: -200.0%~200.0%, means the maximum torque is 2 times of rated torque.

When torque setting is 1~7, 100% of communication and analog input value corresponds to FE-03.

FE-04 **Name**: 0Hz PWN output control mode **Default setting**: 0

Setting range:

0: Invalid

1: Valid

FE-05 **Name**: Forward maximum frequency in torque control mode **Default setting**: 50.00Hz

Setting range: 0.00Hz ~ F0-10 (maximum frequency)

FE-06 **Name**: Reverse maximum frequency in torque control mode **Default setting**: 50.00Hz

Setting range: 0.00Hz ~ F0-10 (maximum frequency)

It is used to set forward or reverse maximum running frequency in torque control.

When torque control, if the load torque is smaller than the motor output torque, the motor speed will increase, and the motor maximum speed should be limited to protect mechanical system from galloping or other accidents.

FE-07 **Name**: ACC time in torque control mode **Default setting**: 0.00s

Setting range: 0.00s ~ 65000s

FE-08 **Name**: DEC time in torque control mode **Default setting**: 0.00s

Setting range: 0.00s ~ 65000s

In torque control mode, the speed variation rate of the motor and load is determined by the difference between the motor output torque and the load torque. So the motor speed may change rapidly, which causes noise or mechanical stress too big, etc. The motor speed can change smoothly by setting suitable torque control ACC/DEC time.

Torque control ACC/DEC time should be set to 0.00s for the application which needs torque responding rapidly.

For example: two motors drag one load by hard wiring, to make sure uniform distribution of loading, one inverter is set to the master & adopts speed control mode, the other is set to the slave & adopts torque control. The torque command of the slave is set to the actual output torque of the master, the slave torque needs to follow the master rapidly, then the torque control ACC/DEC time should be set to 0.00s.

FE-09 **Name**: DPWM switching upper limit frequency **Default setting**: 12.00Hz

Setting range: 0.00Hz ~ 15.00Hz

This value is only valid under V/f mode. In normal conditions, this value is unnecessary to be modified.

FE-10 **Name**: PWM regulation mode **Default setting**: 0

Setting range:

0: Asynchronous mode

1: Synchronous mode

This value is only valid under V/f mode.

0: Asynchronous mode

The regulation mode is fixed as asynchronous mode while the output frequency is less than 85Hz.

1: Synchronous mode

Means the carrier frequency make liner changes along with the output frequency changes, the proportionality of these two values keep the same. It is almost use under high frequency output situation, to enhance the output power quality.

The synchronous regulation mode is only valid while the output frequency bigger than 85Hz. Cause under the high frequency output, the proportionality of carrier frequency and output frequency is higher, asynchronous regulation mode is better.

FE-11 **Name**: Dead zone compensation mode selection **Default setting**: 1

Setting range:

0: no compensation

1: compensation mode 1

2: compensation mode 2

In normal conditions, this value is unnecessary to be modified. Only at some special applications, it may need to select different modes to get better performance, some cases like special request for the output voltage waveform, or the motor has some abnormal status like oscillation.

※ It is suggested to select mode 2 for big power system.

FE-12 **Name**: Depth of random PWM **Default setting**: 0

Setting range:

0: Random PWM invalid

1~10: depth of random PWM

To set the depth of random PWM, it will change the monotonous and harsh noises from motor to be smooth and soft. And it also reduces the electromagnetic interference of inverter to other devices.

While set the depth value to be 0, random PWM is invalid. It will bring different effect to the system by setting different values.

FE-13 **Name**: Fast current limitation enable **Default setting**: 0

Setting range:

0: Disable

1: Enable

To enable the fast current limitation function, it will reduce the over current occurrence probability effectively, to ensure the inverter running uninterruptedly

But if the inverter runs at fast current limitation status for long time, it may cause the inverter be damaged by over heat problem, this kind of situation is not allowed. So that if the inverter runs at fast current limitation status for long time, it will give an alarm of Err40, it means the inverter is overload and it needs to be stopped.

FE-14 **Name**: Current detection compensation **Default setting**: 5

Setting range: 0 ~ 100

To set the current detection compensation value, to set a big value may cause bad control performance. In normal condition, this parameter is unnecessary to be modified.

FE-15 **Name**: SVC optimized mode selection **Default setting**: 1

Setting range:

0: No optimized

1: Optimized mode 1

2: Optimized mode 2

1: Optimized mode 1

Suitable for the applications which needs higher accuracy of torque control linearity.

2: Optimized mode 2

Suitable for the applications which needs higher accuracy of speed control stability.

※ It is suggested to select mode 1 in most of the applications.

FE-16 **Name**: Under voltage level setting **Default setting**: Model depend

Setting range: 60% ~ 140%

To set the voltage value for under voltage fault Err09.

Different voltage levels have different default settings.

Single phase 220V: 200V.

Three phase 220V: 200V.

Three phase 380V: 350V

Chapter 7 Trouble Shooting

7.1 Fault and Trouble Shooting

Fault Name	Converter short circuit protection
Fault Code	**Err01**
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. The cable connecting the motor with the inverter is too long 3. The module is over-heat 4. The cable connections inside the inverter are loosen 5. The main board is abnormal 6. The driver board is abnormal 7. The IGBT module is abnormal
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Install a reactor or output filter 3. Check if the air duct is blocked and if the fan is in normal status, and resolve the existing problems 4. Make sure the cables are connected well 5, 6, 7. Ask for technical support

Fault Name	Over current when acceleration
Fault Code	**Err02**
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. Control mode is vector control & motor parameters are not identified 3. The acceleration time is too short 4. The manual torque boost or V/f curve is not proper 5. The voltage is too low 6. Start the running motor 7. Load is added suddenly during the acceleration 8. Capacity of inverter is too small
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the acceleration time 4. Adjust the manual torque boost or V/F curve 5. Make the voltage in the normal range 6. Select speed tracking start or start the motor till it stops 7. Cancel the sudden added load 8. Select bigger capacity inverter

Fault Name	Over-current when deceleration
Fault Code	**Err03**
Reason	1. Short-circuit or ground fault occurred at inverter output side 2. Control mode is vector control & motor parameters are not identified 3. The deceleration time is too short 4. The voltage is too low 5. Load is added suddenly during the deceleration 6. Have not installed braking unit and braking resistor
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Increase the deceleration time 4. Make the voltage in the normal range 5. Cancel the sudden added load 6. Install braking unit and braking resistor

Fault Name	Over-current when constant speed running
Fault Code	**Err04**
Reason	1. Short-circuit or ground fault occurred at inverter output 2. Control mode is vector control & motor parameters are not identified 3. The voltage is too low 4. Load is added suddenly during running 5. Capacity of inverter is too small
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Identify the motor parameters 3. Make the voltage in the normal range 4. Cancel the sudden added load 5. Select bigger capacity inverter

Fault Name	Over-voltage when acceleration
Fault Code	**Err05**
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during acceleration 3. The acceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the acceleration time 4. Install braking unit and braking resistor

Fault Name	Over-voltage when deceleration
Fault Code	**Err06**
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during deceleration 3. The deceleration time is too short 4. Have not installed braking unit and braking resistor
Solution	1. Make the voltage in the normal range 2. Cancel the external force 3. Increase the deceleration time 4. Install braking unit and braking resistor

Fault Name	Over-voltage when constant speed running
Fault Code	**Err07**
Reason	1. The input voltage is too high 2. There is external force driving the motor to run during the inverter running
Solution	1. Make the voltage in the normal range 2. Cancel the external force or install braking resistor

Fault Name	Power-supply fault
Fault Code	**Err08**
Reason	1. The input voltage is out of range
Solution	1. Make the voltage in the normal range

Fault Name	Under-voltage fault
Fault Code	**Err09**
Reason	1. Instantaneous power-off 2. The input voltage is out of range 3. Bus voltage is abnormal 4. The rectifier bridge and buffer resistor are abnormal 5. The driver board is abnormal 6. The control board is abnormal
Solution	1. Fault Reset 2, 3. Make the voltage in the normal range 4. Replace the rectifier bridge and buffer resistor 5. Replace the driver board 6. Replace the control board

Fault Name	Inverter over load
Fault Code	**Err10**
Reason	1. The load is too heavy or motor blockage occurs 2. Capacity of inverter is too small
Solution	1. Reduce the load, check the status of motor & machinery 2. Select bigger capacity inverter

Fault Name	Motor over load
Fault Code	**Err11**
Reason	1. FA-01 is set improperly 2. The load is too heavy or motor blockage occurs 3. Capacity of inverter is too small
Solution	1. Set FA-01 properly 2. Reduce the load, check the status of motor & machinery 3. Select bigger capacity inverter

Fault Name	Reserved
Fault Code	**Err12**

Fault Name	Output phase failure
Fault Code	**Err13**
Reason	1. The connection between inverter and motor is abnormal 2. Output voltage unbalance during the motor running 3. The driver board is abnormal 4. The IGBT module is abnormal
Solution	1. Inspect whether motor damaged, insulation worn or cable damaged 2. Make sure the motor three phase winding is normal 3. Replace the driver board 4. Replace the IGBT module

Fault Name	IGBT module over-heat
Fault Code	**Err14**
Reason	1. Ambient temperature is too high 2. Air duct is blocked 3. Cooling fans are broken 4. Thermal resistor(temperature sensor) of the module is broken 5. IGBT module is broken
Solution	1. Reduce the ambient temperature 2. Clear the air duct 3. Replace cooling fans 4. Replace the thermal resistor 5. Replace IGBT module

Fault Name	External device fault
Fault Code	**Err15**
Reason	MI terminal receives an external fault signal generated by peripheral device
Solution	Reset running

Fault Name	Communication fault
Fault Code	**Err16**
Reason	1. Master computer works abnormal 2. Communication cable is abnormal 3. FC group parameters are set improperly
Solution	1. Check the connection of master computer 2. Check the communication connection 3. Set FC group parameters properly

Fault Name	DC contactor fault
Fault Code	**Err17**
Reason	1. Drive board or power supply board are abnormal 2. DC contactor is abnormal
Solution	1. Replace drive board or power supply board 2. Replace DC contactor

Fault Name	Current detection fault
Fault Code	**Err18**
Reason	1. Hall sensor is abnormal 2. The driver board is abnormal
Solution	1. Check hall sensor and connection 2. Replace the driver board

Fault Name	Auto tuning fault
Fault Code	**Err19**
Reason	1. Motor parameters are set improperly 2. Parameter identification process is delayed
Solution	1. Set parameters according to the motor nameplate 2. Check the cables connecting inverter with motor

Fault Name	Reserved
Fault Code	**Err20**

Fault Name	EEPROM read/write fault
Fault Code	**Err21**
Reason	1. EEPROM chip is broken
Solution	1. Replace the main board

Fault Name	Inverter hardware fault
Fault Code	**Err22**
Reason	1. Over voltage 2. Over current
Solution	1. Handle as over voltage fault 2. Handle as over current fault

Fault Name	Motor short-circuit to ground
Fault Code	**Err23**
Reason	1. The motor is short-circuit to ground
Solution	1. Replace cables or motor

Fault Name	Reserved
Fault Code	**Err24**

Fault Name	Reserved
Fault Code	**Err25**

Fault Name	Accumulated running time arrival
Fault Code	**Err26**
Reason	1. The accumulated running time reaches the setting value
Solution	1. Clear the record information via parameter initialization function

Fault Name	Reserved
Fault Code	**Err27**

Fault Name	Reserved
Fault Code	**Err28**

Fault Name	Accumulated power-on time arrival
Fault Code	**Err29**
Reason	1. The accumulated power-on time reaches the setting value
Solution	1. Clear the record information via parameter initialization function

Fault Name	Off-load fault
Fault Code	**Err30**
Reason	1. The inverter running current is smaller than FA-64
Solution	1. Confirm if the load breaks away and FA-64 & FA-65 are set properly

Fault Name	PID feedback lost when running
Fault Code	**Err31**
Reason	1. PID feedback is smaller than F9-26
Solution	1. Check PID feedback signal or set F9-26 properly

Fault Name	Current-limiting fault
Fault Code	**Err40**
Reason	1. Whether the load is heavy or the motor is blocked 2. Capacity of inverter is too small.
Solution	1. Reduce the load and detect the motor & machinery condition 2. Select bigger capacity inverter

Fault Name	Reserved
Fault Code	**Err41, Err42, Err43, Err45, Err51**

7.2 Common Faults and Solutions

Fault	Reason	Solution
No display when power-on	1, The input voltage is 0 or too low. 2, The switching power supply on the drive board is broken. 3, Rectifier bridge is broken. 4, Buffer resistors are broken. 5, The control board or keypad is broken. 6, Cables are loose connection	1, Check the input power-supply. 2, Check the DC bus voltage 3, Reconnect the cables 4, Ask for technical support
Display **HC** when power-on	1, Loose connection of the control board and power board. 2, Control board is broken. 3, Motor or motor cables short-circuited with ground. 4, Hall sensor is broken. 5, Input voltage is too low	1, Check the mentioned reasons one by one. 2, Ask for technical support
Display **HC** when starting the inverter, and inverter stops immediately	1, Fans are broken or air duct is blocked. 2, The control cables are short-circuited.	1, Measure the insulation of control cables with magneto-ohmmeter. 2, Ask for technical support
Err23 is displayed when power-on	1, The motor or the output line is short-circuited to the ground. 2, The inverter is damaged.	1, Measure the insulation of the motor and output line with magneto-ohmmeter. 2, Ask for technical support
Err14 is displayed frequently	1, Carrier frequency setting is too high. 2, Fans are broken or air duct is blocked. 3, The inverter inside components are broken (such as thermocouple).	1, Reduce the carrier frequency (F0-15). 2, Replace fans, clear the air duct. 3, Ask for technical support

Motor does not run after starting the inverter	1, Motor and motor cables are abnormal. 2, The inverter parameters are set improperly (motor parameters). 3, The connection of the cables of the driver board and control board are not good. 4, The driver board is broken	1, Make sure the connection of the inverter and motor is very well. 2, Replace the motor or clear the mechanical failure. 3, Check & reset the motor parameters.
Digital input (MIX) terminal is invalid	1, The parameter is set improperly. 2, The external signal is wrong. 3, The jumper between OP and 24V is loose. 4, The control board is broken.	1, Check & reset F5 group parameters. 2, Reconnect the external signal cable. 3, Reconnect the jumper between OP and 24V.
Over voltage and over current fault happens frequently	1, Motor parameters are set improperly. 2, The ACC/DEC time is improper. 3, The load has big fluctuation.	1, Reset motor parameters or perform auto tuning. 2, Set proper ACC/DEC time.
Err17 is displayed when power-on or running	The DC contactor is not closed	1, Check if the contactor cables are loose.. 2, Check if the contactor is broken. 3, Check if the contactor 24V power supply is broken.
Power on display 88888	1, The control board is broken. 2, Loose connection of control board and drive board.	1, Replace the control board. 2, Reconnect the control board and power board

Chapter 8 EMC (Electromagnetic Compatibility)

8.1 Definition

Electromagnetic compatibility is the ability of the electric equipment to work in the electromagnetic interference environment and implement its function stably without interferences in the electromagnetic environment.

8.2 EMC Standard Description

In accordance with the requirements of the national standard GB/T12668.3, the inverter needs to comply with electromagnetic interference and anti-electromagnetic interference requirements.

Products apply the latest international standard—IEC/EN61800-3: 2004 (Adjustable speed electrical power drive systems part 3: EMC requirements and specific test methods), which is equivalent to the national standard GB/T12668.3.

IEC/EN61800-3 assesses the inverter in terms of electromagnetic interference and anti-electronic interference. Electromagnetic interference mainly tests the radiation interference, conduction interference and harmonics interference on the inverter (required for the inverter for civil use). Anti-electromagnetic interference mainly tests the conduction interference rejection, radiation interference rejection, surge interference rejection, fast and mutable pulse group interference rejection, ESD interference rejection and power low frequency end interference rejection (specific test items including: 1. Interference rejection tests of input voltage sag, interrupt and change; 2. Phase conversion interference rejection test; 3. Harmonic input interference rejection test; 4. Input frequency change test; 5. Input voltage unbalance test; 6. input voltage fluctuation test).

The tests should be conducted strictly in accordance with the above requirements of IEC/ EN61800-3, and the products of our company are installed and used according to Section 7.3 and have good electromagnetic compatibility in general industry environment.

8.3 EMC Guide

8.3.1 Harmonic effect

Higher harmonics of power supply may damage the inverter. Thus, at some places where mains quality is rather poor, it is recommended to install AC input reactor.

8.3.2 Electromagnetic interference and installation precautions

There are two kinds of electromagnetic interferences, one is interference of electromagnetic noise in the surrounding environment on the inverter, and the other is interference of inverter on the surrounding equipment.

Installation precautions:

1) The earth wires of the Inverter and other electric products should be well grounded;

2) The power input and output power cables of the inverter and weak current signal cables (e.g. control line) should not be arranged in parallel and vertical arrangement is preferable.

3) It is recommended that the output power cables of the inverter employ shield cables or steel pipe shielded cables and that the shielding layer be earthed reliably. The lead cables of the equipment suffering interferences are recommended to employ twisted-pair shielded control cables, and the shielding layer should be earthed reliably.

4) When the length of motor cable is longer than 100 meters, it needs to install output filter or reactor.

8.3.3 Handling method for the interferences of the surrounding equipment on the inverter

The electromagnetic interference on the inverter is generated because plenty of relays, contactors and electromagnetic brakes are installed near the inverter. When the inverter has error action due to the interferences, the following measures can be taken:

1) Install surge suppressor on the devices generating interference;

2) Install filter at the input end of the inverter. Refer to Section 7.3.6 for the specific operations;

3) The lead cables of the control signal cable of the inverter and the detection line employ shielded cable and the shielding layer should be earthed reliably.

8.3.4 Handling method for the interferences of inverter on the surrounding equipment

These interferences include two types: one is radiation interference of the inverter, and the other is conduction interference of the inverter. These two types of interferences cause the surrounding electric equipment to suffer electromagnetic or electrostatic induction. The surrounding equipment hereby produces error action. For different interferences, it can be handled by referring to the following methods:

1) For the measuring meters, receivers and sensors, their signals are generally weak. If they are placed nearby the inverter or together with the inverter in the same control cabinet, they are easy to suffer interference and thus generate error actions. It is recommended to handle with the following methods: Put in places far away from the interference source; do not arrange the signal cables with the power cables in parallel and never bind them together; both the signal cables and power cables employ shielded cables and are well earthed; install ferrite magnetic ring (with suppressing frequency of 30 to 1,000MHz) at the output side of the inverter and wind it 2 to 3 cycles; install EMC output filter in more severe conditions.

2) When the equipment suffering interferences and the inverter use the same power supply, it may cause conduction interference. If the above methods cannot remove the interference, it should install EMC filter between the inverter and the power supply (refer to Section 8.3.6 for the prototyping operation); the

surrounding equipment is separately earthed, which can avoid the interference caused by the leakage current of the inverter's earth wire when common earth mode is adopted.

3) The surrounding equipment is separately earthed, which can avoid the interference caused by the leakage current of the inverter's earth wire when common earth mode is adopted.

8.3.5 Leakage current and handling

There are two forms of leakage current when using the inverter. One is leakage current to the earth, and the other is leakage current between the cables.

1) Factors influencing the leakage current to the earth and the solutions:

There are distributed capacitance between the lead cables and the earth. The larger the distributed capacitance is, the larger the leakage current will be. The distributed capacitance can be reduced by

effectively reducing the distance between the inverter and the motor. The higher the carrier frequency is, the larger the leakage current will be. The leakage current can be reduced by reducing the carrier frequency. However, reducing the carrier frequency may result in addition of motor noise. Note that additional installation of reactor is also an effective method to remove the leakage current.

The leakage current may increase following the addition of circuit current. Therefore, when the motor power is high, the corresponding leakage current will be high too.

2) Factors of producing leakage current between the cables and solutions:

There is distributed capacitance between the output cables of the inverter. If the current passing the lines has higher harmonic, it may cause resonance and thus result in leakage current. If thermal relay is used, it may generate error action.

The solution is to reduce the carrier frequency or install output reactor. It is recommended that thermal relay not be installed before the motor when using the inverter, and that electronic over current protection function of the inverter be used instead.

8.3.6 Precautions for Installing EMC input filter at the input end of power supply

1) When using the inverter, please follow its rated values strictly. Since the filter belongs to Classification I electric appliances, the metal enclosure of the filter should be large and the metal ground of the installing cabinet should be well earthed and have good conduction continuity. Otherwise there may be danger of electric shock and the EMC effect may be greatly affected.

2) Through the EMC test, it is found that the filter ground must be connected with the PE end of the inverter at the same public earth. Otherwise the EMC effect may be greatly affected.

3) The filter should be installed at a place close to the input end of the power supply as much as possible.

Chapter 9 MODBUS Communication Protocol

KD series inverter provides RS485 communication interface, and adopts MODBUS communication protocol. User can realize centralized monitoring through PC/PLC, host computer, and also can set inverter's operating commands, modify or read function parameters, read operating status and fault information, etc.

9.1 About Protocol

This serial communication protocol defines the transmission information and use format in the series communication. It includes the formats of master-polling, broadcast and slave response frame, and master coding method with the content including slave address (or broadcast address), command, transmitting data and error checking. The response of slave adopts the same structure, including action confirmation, returning the data and error checking etc. If slave takes place the error while it is receiving the information or cannot finish the action demanded by master, it will send one fault signal to master as a response.

9.2 Application Method

The inverter could be connected into a "Single-master & Multi-slaves" PC/PLC control network with RS485 bus.

9.3 Bus Structure

(1) Interface mode

RS485

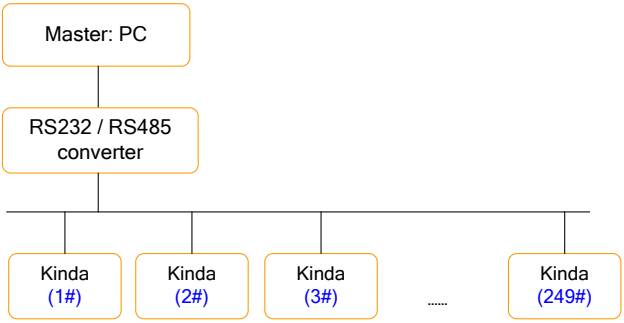
(2) Transmission mode

There provide asynchronous series and half-duplex transmission mode. At the same time, just one can send the data and the other only receives the data between master and slave. In the series asynchronous communication, the data is sent out frame by frame in the form of message.

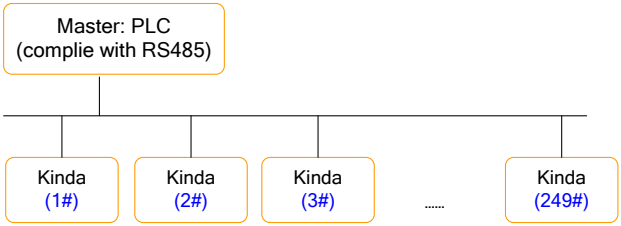
(3) Topological structure

In Single-master Multi-slave system, the setup range of slave address is 0 to 247. 0 refers to broadcast communication address. The address of slave must be exclusive in the network. That is basic condition of MODBUS communication.

a. Connect with PC



b. Connect with PLC

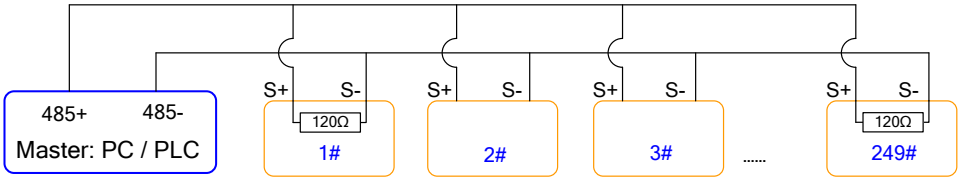


9.4 Interfaces and wiring connection

KD series inverter provides S+ and S- interfaces for Modbus communication.

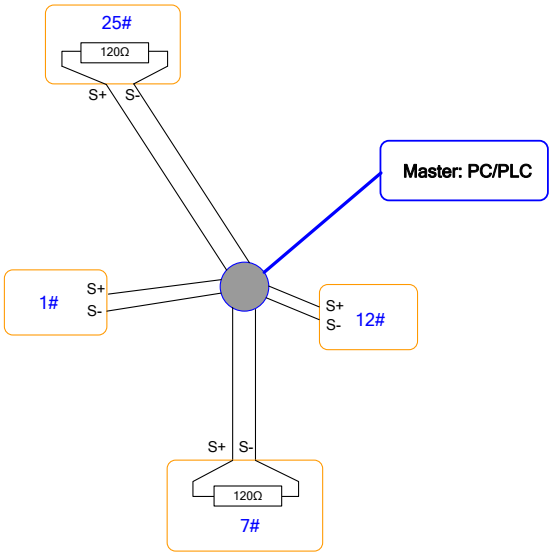
There are two kinds of communication type suitable for Modbus connection;

(1) Daisy chain connection



Notice: the **first one** and **last one inverters** should connect the terminal resistor.

(2) star connection



Notice: the **furthest one (25#)** and **second furthest one (7#)** inverters should connect the terminal resistor.

9.5 Protocol Description

KD series inverter communication protocol is a kind of asynchronous serial master-slave communication protocol. In the network, only one equipment (master) can build a protocol (Named as “Inquiry/Command”). Other equipments (slave) response “Inquiry/Command” of master only by providing the data, or doing the action according to the master’s “Inquiry/Command”. Here, master is Personnel Computer, Industrial control equipments or Programmable logical controller, and the slave is inverter or other communication equipments with the same communication protocol. Master not only can visit some slave separately for communication, but also sends the broadcast information to all the slaves. For the single “Inquiry/Command” of master, all of slaves will return a signal that is a response; for the broadcast information provided by master, slave needs not feedback a response to master.

9.6 Communication Data Structure

MODBUS protocol communication data format of KD series inverter is shown as below:

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 entire message frame must be transmitted as a continuous data stream. If a idle time is more than 1.5

bytes before completion of the frame, the receiving device flushes the incomplete message and assumes that the next byte will be the address field of a new message. Similarly, if a new message begins earlier than 3.5 bytes interval following a previous message, the receiving device will consider it as a continuation of the previous message. Because of the frame's confusion, at last the CRC value is incorrect and communication fault will occur.

RTU frame format:

START	Transmission time of 3.5 bytes
Slave Address	Communication address : 0 to 249
Command Code	03H: Read slave parameters 06H: Write slave parameters
DATA (N-1)	Data: Function code parameter address, the number of function code parameter, Function code parameter, etc.
DATA (N-2)	
……	
DATA 0	
CRC Low byte	Detection Value: CRC value
CRC High byte	
END	Transmission time of 3.5 bytes

9.7 Command Code and Communication Data Description

9.7.1 Command code: 03H, reads N words. (There are 12 characters can be read at the most.)

For example: The inverter start address F002 of the slave 01 continuously reads two consecutive values.

Master command information

Address	01H
Command Code	03H
Start Address High byte	F0H
Start Address Low byte	02H
Register Number High byte	00H
Register Number Low byte	02H
CRC Low byte	56H
CRC High byte	CBH

Slave responding information

Address	01H
Command Code	03H
Byte Number	04H
Data F002H High byte	00H
Data F002H Low byte	00H
Data F003H High byte	00H
Data F003H Low byte	01H
CRC Low byte	3BH
CRC High byte	F3H

9.7.2 Command code: 06H, write a word

For example: Write 5000(1388H) into address F00AH, slave address 02H.

Master command information

Address	02H
Command Code	06H
Data Address High byte	F0H
Data Address Low byte	0AH
Data Content High byte	13H
Data Content Low byte	88H
CRC Low byte	97H
CRC High byte	ADH

Slave responding information

Address	02H
Command Code	06H
Data Address High byte	F0H
Data Address Low byte	0AH
Data Content High byte	13H

Data Content Low byte	88H
CRC Low byte	97H
CRC High byte	ADH

9.7.3 CRC checking

In RTU mode, messages include an error-checking field that is based on a CRC method. The CRC field checks the contents of the entire message. The CRC field is two bytes, containing a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value received in the CRC field. If the two values are not equal, an error results.

The CRC is started by 0xFFFF. Then a process begins of applying successive eight-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

During generation of the CRC, each eight-bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low byte is appended first, followed by the high byte. 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);
        }
```

9.7.4 Address definition of communication parameter

Here is about address definition of communication parameter. It's used to control the inverter operation, status and related parameter setting.

The mark rules of function code parameters address:

The group number and mark of function code is the parameter address for indicating the rules.

(1) F0~FF group parameter address:

High byte: F0 ~ FF(F group),

Low byte: 00 to FF

(2) U0 group parameter address:

High byte: 70H,

Low byte: 00 to FF

For example:

F3-12, address indicates to 0xF30C

FC-05, address indicates to 0xFC05

U0-03, address indicates to 0x7003

Note:

1. Group FF: Either the parameter cannot be read, nor be changed.
2. Group U0: Only for reading parameter, cannot be changed parameters.
3. Some parameters cannot be changed during operation; some parameters regardless of what kind of status the inverter in, the parameters cannot be changed. Change the function code parameters, pay attention to the scope of the parameters, units, and relative instructions.

Besides, due to EEPROM be frequently stored, it will reduce the lifetime of EEPROM. So in the communication mode, some function codes needn't be stored, only change the RAM value.

For F group parameters, to achieve this function, just change high bit F of the function code into 0..

Corresponding function code addresses are indicated below:

(1) F0~FF group parameter address:

High byte: 00 to FF,

Low byte: 00 to FF

(2) U0 group parameter address:

High byte: 70H,

Low byte: 00 to FF

For example:

F3-12, address indicates to 030C

FC-05, address indicates to 0C05

These addresses can only act writing RAM, it cannot act reading. When act reading, it is an invalid address.

(2) Stop/start parameter address

Parameter Address	Parameter Description
1000H	* Communication setting value (-10000 to 10000) (Decimal)
1001H	Running frequency
1002H	Bus voltage
1003H	Output voltage
1004H	Output current
1005H	Output power
1006H	Output torque
1007H	Running speed
1008H	MI input status
1009H	FM, AM output status
100AH	VI voltage
100BH	CI voltage
100CH	Reserved
100DH	Counting value input
100EH	Length value input
100FH	Load speed
1010H	PID setting
1011H	PID feedback

Parameter Address	Parameter Description
1012H	Simple PLC running step
1013H	Reserved
1014H	Feedback speed, unit is 0.1Hz
1015H	Remain running time
1016H	VI voltage before calibration
1017H	ci voltage before calibration
1018H	Reserved
1019H	Linear speed
101AH	Current power on time
101BH	Current running time
101CH	Reserved
101DH	Communication setting value
101EH	Actual feedback speed
101FH	Main frequency A display
1020H	Auxiliary frequency B display

Note:

Communication setting value is the percentage of relative value, and 10,000 corresponds to 100.00%, -10000 corresponds to -100.00%.

To the data of frequency, the percentage is the percentage of relative maximum frequency (F0-10).

To the data of torque, the percentage is F2-10 (torque upper limit).

(3) Control command input to inverter (write only)

Command Word Address	Command Function
2000H	0001: Forward running
	0002: Reverse running
	0003: Forward jog
	0004: Reverse jog
	0005: Coast to stop
	0006: Deceleration to stop
	0007: Fault reset

(4) Read inverter status: (read only)

Status Word Address	Status Word Function
3000H	0001: Forward running
	0002: Reverse running
	0003: Stop

(5) Parameters locking password check: (If the return is 8888H, it means the password check passes.)

Password Address	Content of Input password
1F00H	*****

(6) Digital output terminal control: (write only)

Command Address	Command Content
2001H	BIT0: MO1 output control
	BIT1: MO2 output control
	BIT2: RELAY1 output control
	BIT3: RELAY2 output control
	BIT4 ~ BIT9: Reserved

(7) Analog output AM control: (write only)

Command Address	Command Content
2002H	0～7FFF refers to 0%～100%

(8) Analog output FM control: (write only)

Command Address	Command Content
2003H	0～7FFF refers to 0%～100%

(9) Pulse output control: (write only)

Command Address	Command Content
2004H	0～7FFF refers to 0% ～100%

(10) Inverter fault code description:

Inverter Fault Address	Inverter Fault Information
8000H	0000: No fault
	0001: Reserved
	0002: Over current when acceleration
	0003: Over current when deceleration
	0004: Over current when constant speed running
	0005: Over voltage when acceleration
	0006: Over voltage when deceleration
	0007: Over voltage when constant speed running
	0008: Reserved
	0009: Under voltage fault
	000A: Inverter overload
	000B: Motor overload
	000C: Reserved
	000D: Output phase failure
	000E: Module overheat
	000F: External fault

	0010: Communication fault
	0011: Contactor fault
	0012: Current detection fault
	0013: Motor autotuning fault
	0014: Reserved
	0015: Parameter R/W fault
	0016: Inverter hardware fault
	0017: Motor short circuit to ground
	0018: Reserved
	0019: Reserved
	001A: Running time arrival
	001B: Customized fault 1
	001C: Customized fault 2
	001D: Power on time arrival
	001E: Off load
	001F: PID feedback lost when running
	0028: Fast current limiting over time fault
	0029: Reserved
	002A: Speed deviation oversize
	002B: Motor over speed

9.8 FC Group Communication Parameter Description

FC-00	Baud Rate	Factory Setting	6005
	Setting range	Unit place: Modbus 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS Tens place: Reserved Hundred place: Reserved Thousand place: Reserved	

This parameter is used to set the data transmission rate between host computer and the inverter. Please note that baud rate of the host computer and inverter must be the same. Otherwise, the communication is impossible. The bigger baud rate is, the faster communication is.

FC-01	Data Format	Factory Setting	0
	Setting range	0: No check: Data format <8-N-2> 1: Even parity Check :data format <8-E-1> 2: Odd Parity Check : data format <8-O-1> 3: No check: Data format <8-N-1>	

The setting data format of host computer and inverter must be the same; otherwise, the communication is impossible.

FC-02	Local Address	Factory Setting	1
	Setting range	1~249, 0 is broadcast address	

When the local address is set to be 0, that is broadcast address, it can realize the broadcast function of host computer.

Local address must be unique (except broadcast address). This is the base of point-to-point communication between host computer and inverter.

FC-03	Response Delay	Factory Setting	2ms
	Setting range	0~20ms	

Response delay: It refers to the interval time from the inverter finishes receiving data to sending data to the host computer. If the response delay is less than system processing time, then the response delay is based on the system processing time. If the response delay is more than system processing time, after the system processing the data, it should be delayed to wait until the response delay time arrives, then sending data to host computer.

FC-04	Communication Timeout	Factory Setting	0.0s
	Setting range	0.0s (invalid) 0.1~60.0s	

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

When the function code set to be valid value, if the interval time between the communication and the next communication is beyond the communication timeout, the system will report communication failure error (Err16). At normal circumstances, it is set to be invalid. If in the continuous communication system, set the parameter, you can monitor the communication status.

FC-05	Communication Protocol selection	Factory Setting	31
	Setting range	Unit place: Modbus 0: Nonstandard Modbus protocol 1: Standard Modbus protocol Tens place: Reserved	

FC-05=01: Select standard MODBUS protocol

FC-05=00: When reading the command, the slave return is one byte than the standard MODBUS protocol's, for details refer to communications Data Structure of this protocol.

FC-06	Communication Read Current Resolution	Factory Setting	0
	Setting range	0: 0.01A 1: 0.1A	

It is used to confirm the output current unit when communication reads output current.