CONTENTS

Chapter 1 Overview

Thank you for choosing SY6000 series AC Drive!

SY6000 series AC Drive is a high-quality, multi-function, low-noise variable frequency drive which is designed, developed and manufactured according to international standards. IEC618/IEC610000 It can meet different needs of industrial conditions.

The inverter applies advanced control technology of space voltage vector PWM, with functions of constant voltage control, power-off restart, dead zone compensation, automatic torque boost, online modification parameter, high-speed impulse input, simple PLC and traverse control.

For safety, please read the manual thoroughly before using SY6000 series inverters. Meanwhile please retain the manual and you will use it when regulate, maintain and inspect the equipments in future.

1.1 Purchase inspection

Do not install or operate any inverter with damage or defective parts. Otherwise people are risk of injury.

Please verify the following items after open the box.

Verification item	Verification method
It is what you order, or not	Please watch nameplate on the inverter side.
Parts damage or not	Please check overall appearance.
Screws loose or not	If necessary, use a screwdriver to check it.

If abnormal situation happens, please get in touch with the local agent.

1.2 Safety instruction

Please read carefully the manual before install, operate, maintain or inspect.

Precautions in the manual are classified into "Note","Caution"and"Danger".

Take steps to ensure the correct operation.

Caution It is dangerous if misuse, possibly make people injury or machine damage.

Danger It is very dangerous if misuse, possibly make people die.

Please comply with above important precautions in any circumstance. Warning mark (as show below) will show on the front cover of the inverter. Do comply with these guidelines before using the inverter.

Caution
■ Read the instruction manual before installation and operation. ■ Disconnect power and then wait more than 5 minutes for capacitor discharge before opening front cover. ■ Do not connect power to the output terminals U, V, W.

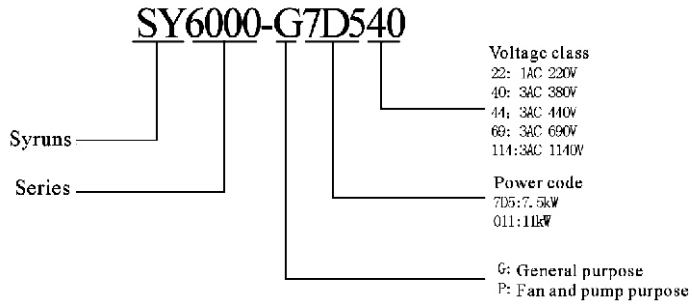
1.3 Technical specification

Item		Specification
Input	Input voltage	220/380V±15%
	Input frequency	47～63Hz
Output	Output voltage	0～input voltage
	Output frequency	0～600Hz
Peripheral interface characteristics	Programmable digital input	4 switch input, 1 high-speed impulse input
	Programmable analog input	AI1: 0～10V input AI2: 0～10V input or 0～20mA input
	Programmable open collector output	2 output (3.7kW and above: 1 open collector output)
	Relay output	1 output (3.7kW and above: 2 relay output)
	Analog output	2 output, one is 0～10V, the other is 0～20mA or 0～10V
	Keypad	Display: 5-digit 8-section LED (Red), 2 indicators; parameter setting: 8 keys (including QUICK/JOG key), 1 potentiometer

Item		Specification
Technical performance characteristics	Control mode	All digital space voltage vector SVPWM algorism
	Overload capacity	G purpose: 150% rated current 60s P purpose: 120% rated current 60s
	Speed ratio	1: 100
	Carrier frequency	1.0～10.0kHz
	Torque boost	Linear, multi-point, 1.3th power, 1.7th power, 2.0th power reduced torque; Compensation voltage range: automatic boost and manual boost 0.1~10%
	Automatic voltage adjustment	It can automatically maintain output voltage constant when grid voltage fluctuates.
	Automatic current adjustment	When the current is over current limit, under clocking automatically limits output current.
Function characteristics	Frequency setting mode	Keypad digital, analog input, keypad potentiometer, impulse frequency, communication, multi-step speed and simple PLC, PID setting and so on, switch-over of setting modes.
	Simple PLC, multi-step speed control	16-step speed control
	Special function	Traverse control, length control, time control
	QUICK/JOG key	User-defined multi-function hot key
	Protection function	Over-current, over voltage, under-voltage, over-heat, phase failure, over-load and motor over-load

Item		Specification
Working condition	Installation site	Indoor, altitude of less than 1km, dust free, non-corrosive gases, no direct sunlight
	Application environment	-10℃～+40℃, 20～90%RH (no dew)
	Vibration	Less than 0.5g
	Storage temperature	-25℃～+65℃
	Installation type	Wall-mounted type, floor cabinet type
Cooling mode		Air-forced cooling

1.4 Instruction of model no.



1.5 Nameplate instruction

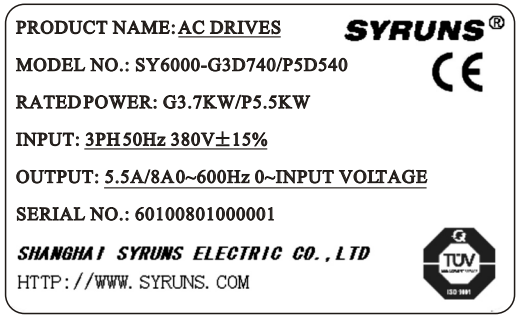


Figure 1-1 Nameplate instruction

1.6 Selection guide

Table 1-1 Selection guide of SY6000 series inverters

Voltage Class	Purpose	Model no.	Power rating (kW)	Rated output current (A)
1PH 220V	General purpose	SY6000-G1D522	1.5	7
		SY6000-G2D222	2.2	11
3PH 380V		SY6000-G0D740	0.75	2
		SY6000-G1D540	1.5	4
		SY6000-G2D240	2.2	5.5
		SY6000-G3D740	3.7	8
		SY6000-G5D540	5.5	13
		SY6000-G7D540	7.5	17
		SY6000-G01140	11.0	24
		SY6000-G01540	15.0	33
		SY6000-G01840	18.5	39
		SY6000-G02240	22.0	44
		SY6000-G03040	30.0	60
		SY6000-G03740	37.0	75
		SY6000-G04540	45.0	90
		SY6000-G05540	55.0	110
		SY6000-G07540	75.0	150
		SY6000-G09040	90.0	175
		SY6000-G11040	110.0	210
		SY6000-G13240	132.0	255
		SY6000-G16040	160.0	305
		SY6000-G18540	185.0	340
		SY6000-G20040	200.0	380
		SY6000-G22040	220.0	425
		SY6000-G24540	245.0	480
		SY6000-G28040	280.0	545
		SY6000-G31540	315.0	615
		SY6000-G35040	350.0	680
		SY6000-G40040	400.0	760

Voltage Class	Purpose	Model no.	Power rating (kW)	Rated output current (A)
3PH 380V	Fan and pump purpose	SY6000-P2D240	2.2	5.5
		SY6000-P3D740	3.7	8
		SY6000-P5D540	5.5	13
		SY6000-P7D540	7.5	17
		SY6000-P01140	11.0	24
		SY6000-P01540	15.0	33
		SY6000-P01840	18.5	39
		SY6000-P02240	22.0	44
		SY6000-P03040	30.0	60
		SY6000-P03740	37.0	75
		SY6000-P04540	45.0	90
		SY6000-P05540	55.0	110
		SY6000-P07540	75.0	150
		SY6000-P09040	90.0	175
		SY6000-P11040	110.0	210
		SY6000-P13240	132.0	255
		SY6000-P16040	160.0	305
		SY6000-P18540	185.0	340
		SY6000-P20040	200.0	380
		SY6000-P22040	220.0	425
		SY6000-P24540	245.0	480
		SY6000-P28040	280.0	545
		SY6000-P31540	315.0	615
		SY6000-P35040	350.0	680
		SY6000-P40040	400.0	760

Chapter 2 Installation

Caution

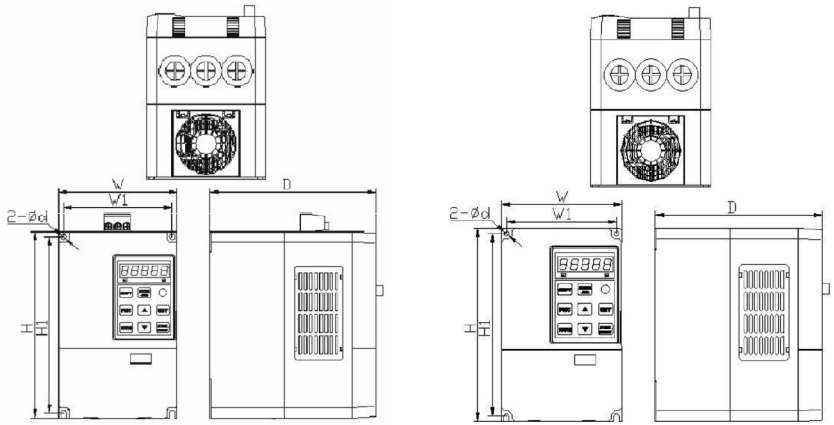
- The person without passing the training manipulate the device or any rule in the "Caution" being violated, will cause severe injury or property loss. Only the person, who has passed the training on the design, installation, commissioning and operation of device and got the certification, is permitted to operate this equipment.
- Input power cable must be connected tightly, and the equipment must be grounded securely.
- Even if the inverter is not running, the following terminals may still have dangerous voltage:
  -Power supply terminals R, S, T
  -Connect motor's terminals U, V, W
  -Connect reactor ⊕, ⊕1
  -Connect braking unit ⊕, ⊖
  -Connect braking resistor's terminals ⊕, PB
- When power off, should not install the inverter until 10 minutes after, which will ensure the device discharge completely.
- Sectional area of grounding conductor is at least 6mm^2,and corresponding data in the below table is sectional area of grounding conductor:

Sectional area of power line conductor (mm^2)	Sectional area of grounding conductor (mm^2)
S≤16	6
16＜S≤35	16
35＜S	S/2

Danger

- When move the inverter, please lift by its base and don't lift by the panel. Otherwise may cause the main unit fall off which may result in personal injury.
- Install the inverter on the fireproofing material (such as metal) to prevent fire.
- When need install two or more the inverters in one cabinet, cooling fan should be provided to make sure that the air temperature is lower than 40℃. Otherwise it could cause fire or damage the device.

2.1 Overall dimensions



(a) G0.75-2.2kW/P3.7kW (b) G3.7-7.5kW/P5.5-11kW

Figure 2-1 Overall of SY6000 series

Table 2-1 Installation dimensions

Voltage Class	Model no.	W	W1	H	H1	D	D
1PH 220V	SY6000-G1D522	115	105	180	170	160	5
	SY6000-G2D222						
3PH 380V	SY6000-G0D740	115	105	180	170	160	5
	SY6000-G1D540/P2D240						
	SY6000-G2D240/P3D740						
	SY6000-G3D740/P5D540	150	138	235	223	160	5
	SY6000-G5D540/P7D540	190	178	300	288	179	6.5
	SY6000-G7D540/P01140						

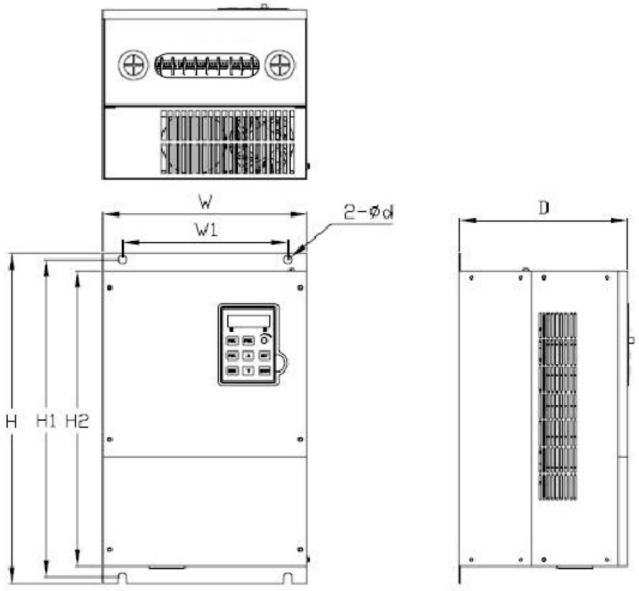
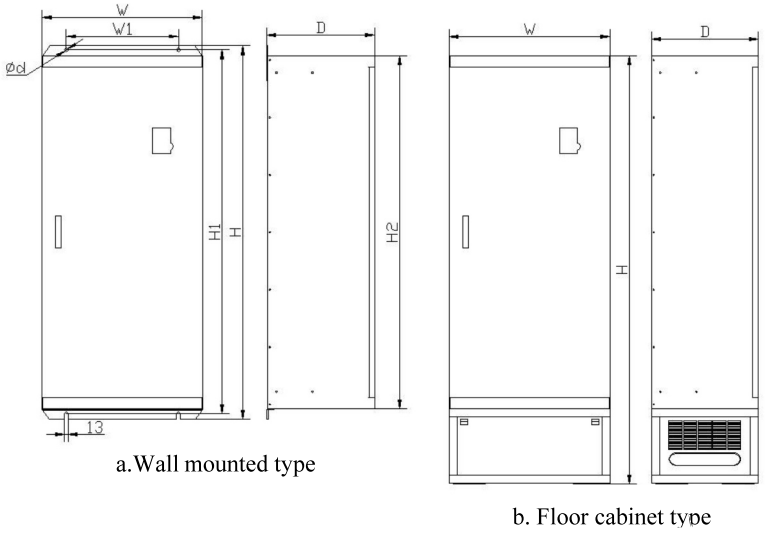


Figure 2-2 (a) G011-160kW/P015-185kW



a.Wall mounted type

b. Floor cabinet type

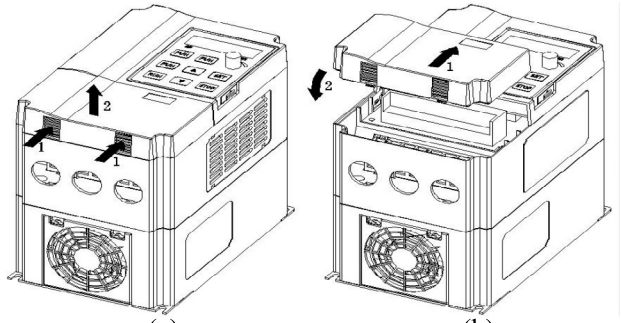
Figure 2-2（b） G185kW/P200kW or above

Table 2-2 Installation dimensions

Voltage class	Model no.	Type	W	W1	H	H1	H2	D	d
3PH 380V	SY6000-G01140/P01540	Wall mounted type	242	196	392	376	350	200	9.5
	SY6000-G01540/P01840								
	SY6000-G01840/P02240								
	SY6000-G02240/P03040		293	200	504	484	460	250	9.5
	SY6000-G03040/P03740								
	SY6000-G03740/P04540		310	200	558	538	510	255	9.5
	SY6000-G04540/P05540								
	SY6000-G05540/P07540								
	SY6000-G07540/P09040		380	300	610	590	560	298	12
	SY6000-G09040/P11040								
	SY6000-G11040/P13240		420	350	770	746	720	340	13
	SY6000-G13240/P16040								
	SY6000-G16040/P18540		530	400	1000	970	940	375	13
	SY6000-G18540/P20040								
	SY6000-G20040/P22040								
	SY6000-G22040/P24540		600	420	1530	1490	1450	400	—
	SY6000-G24540/P28040								
	SY6000-G18540/P20040	Floor cabinet type	600	—	1750	—	—	400	—
	SY6000-G20040/P22040								
	SY6000-G22040/P24540								
	SY6000-G24540/P28040								
	SY6000-G28040/P31540		730	—	2000	—	—	605	—
	SY6000-G31540/P35040								
	SY6000-G35040/P40040								
	SY6000-G40040								

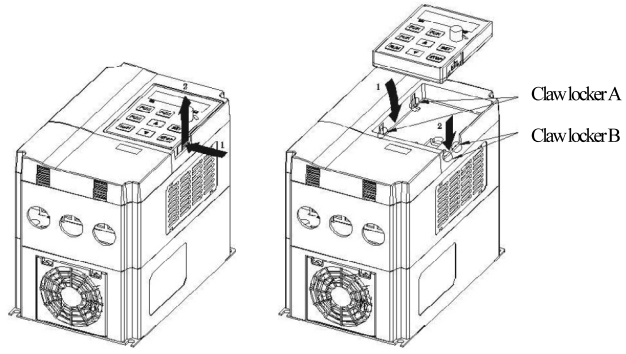
Note Diagram and dimensions of G280kw/P315kw or above for reference only.

2.2 Disassembly and assembly of panel and keypad



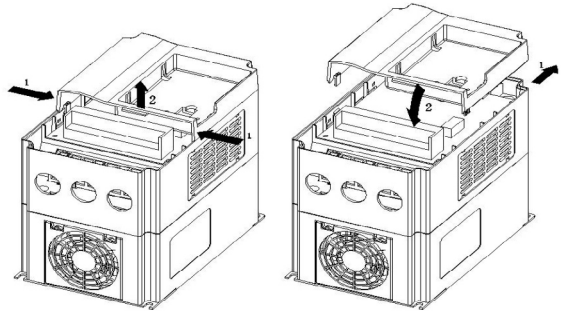
(a) (b)

Figure 2-3 Disassembly and assembly of lower panel



(a) (b)

Figure 2-4 Disassembly and assembly of keypad



(a) (b)

Figure 2-5 Disassembly and assembly of upper panel

1. Disassembly and assembly of lower panel

(1) Disassembly of lower panel:

As shown in Figure 2-3 (a), press two faces according to direction 1, meanwhile, lift lower part of lower panel according to direction 2.

(2) Assembly of lower panel:

As shown in Figure 2-3 (b), when assembly, firstly align lower panel and upper panel, lean panels forward, embed bayonet shapes of panel in upper panel, and then press down the panels according to direction 2.

2. Disassembly and assembly of keypad

(1) Disassembly of keypad

As shown in Figure 2-4 (a), press the buckle on the side of keypad according to direction 1, unhook it from upper panel, lift it according to direction 2, and then get the keypad.

(2) Assembly of keypad

As shown in Figure 2-4 (b), stick Digital Console from the direction 1 claw locker A (2 places), pressing to keep toward direction 2 immediately after hearing the "click" voice, stick the claw locker B (2 places).

3. Disassembly and assembly of upper panel

(1) Disassembly of upper panel: As shown in Figure 2-5 (a), make an effort toward direction 1 to press the two sides of console support, in the meantime, please press direction 2 to lift console support lower part.

(2) Assembly of upper panel: As shown in Figure 2-5 (b), console support head two cards hang up to block from the direction 1 the hull body (2 places), press to keep toward direction 1 immediately after hearing "click" voice.

2.3 Requirements and management of installation site

Note
1. Please hold the bottom of the inverter when carry it. Risk of feet injury if only holding the panel. 2. Please install in metal board and other nonflammable materials. Risk of fire if installing in flammable materials. 3. If install two or more the inverters in the same cabinet, please set the cooling fan, and keep the air temperature below 40℃. Risk of fire and other accidents if overheat.

2.3.1 Humidity

Running ambient temperature is between -10℃～+40℃. Must derate the inverter when over 40℃, and the maximum temperature is not more than 50℃. When the ambient temperature is over 40℃, derate 4% every temperature-rising 1℃. Air corresponding humidity is 20~90%, no dew.

2.3.2 Altitude

When the inverter install under 1km altitude, it can run at rated frequency. When the altitude is over 1km, the inverter must derate, specified derating amplitude is as shown in Figure 2-6:

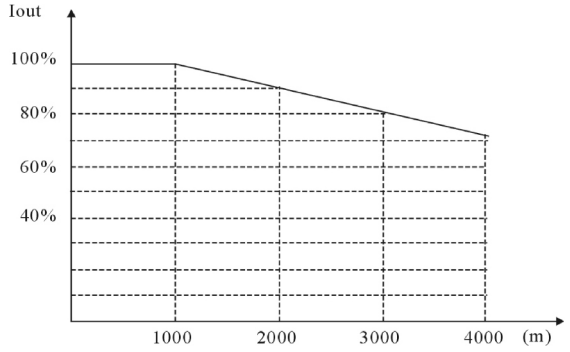


Figure 2-6 Altitude of installation site

2.3.3 Others

- Do not install on combustible materials such as woods.
- Avoid direct sunlight.
- Non-flammable, explosive, oily, corrosive harmful gas, liquid or mixture.
- No dust, oily dust, salt air, floating fiber or metal particle.
- Installation base is stable without vibration.
- No electromagnetic interference, far away from interference source.

2.3.4 Precaution

- Please put a dust cover on the inverter when install.
- Do not fall metal fragments into the internal of the inverter when drill holes.
- Please remove dust cover after installation finishes.

2.4 Installation space

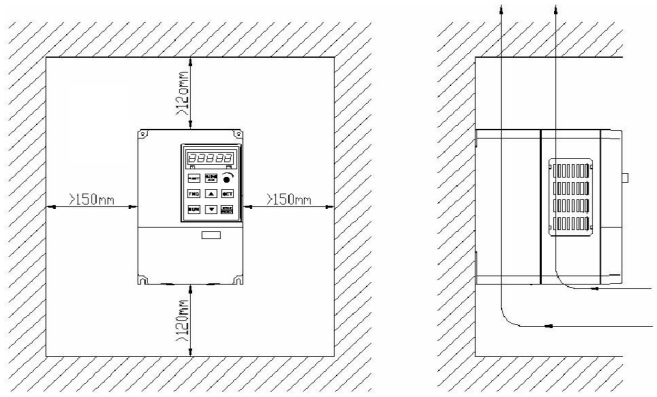


Figure 2-7 Installation direction and space of SY6000 series

In order to get good effect of cooling cycle, must install the inverter in vertical direction. Please refer to Figure2-7.

Note

Add the air deflector when apply the up-down installation.

Chapter 3 Wiring

Danger

1.Before wiring, please confirm the cut-off of input power supply. Risk of electric shock and fire.

2.Wiring operations must be carried out by electrical engineering specialists. Risk of electric shock and fire.

3.Ground terminal must be reliably grounded. Risk of electric shock and fire. 220V class: grounding resistance ≤ 100Ω; 380V class: grounding resistance ≤ 10Ω.

4.After connecting with the terminal of emergency stop, be sure to check the validity of actions. Risk of injury. (The responsibility of wrong wiring is undertaken by users.)

5.Do not touch the inverters with wet hands. Do not directly touch the output terminals. Do not connect the output terminals of inverter with the housings. Do not be short circuit between output terminals. Risk of electric shock and short circuit.

6.Wait 10 minutes after switches disconnect, and confirm the power indicator has been extinguished, then it's permitted to start the installation after the inverter discharges off. Risk of electric shock.

Note

1. Ensure qualified electrical specialist to carry out operation in order to the inverter's safe running.
2. Ensure rated voltages of AC main circuit power supply and the inverter are the same. Risk of injury and fire.
3. Do not do withstand voltage test on the inverter. It will damage semiconductor components.
4. Please connect braking unit or braking resistor according to wiring diagram. Risk of fire.
5. Please use the screwdriver of specified torque fastening terminals.
6. Do not connect the cable of input power supply to output U, V, W terminals. Please confirm the correct connection between power line and motor line before power up.

   Power lines connect on R, S, T terminals, and motor lines connect on U, V, W terminals. It will damage the internal of the inverter if add voltage on output terminals.
7. Do not switch phase-shift capacitor into output circuit. It will damage the internal of the inverter.
8. Do not switch electromagnetic switch and electromagnetic contactor into output circuit.

   When the inverter is running with load, surge current generated by electromagnetic switches, electromagnetic contactors will cause the over current protection circuit action of the inverter.
9. Please use cautiously ELCB on input terminal of the inverter. Please set leakage current ≥200mA if the system needs.

3.1 Connection with peripheral devices

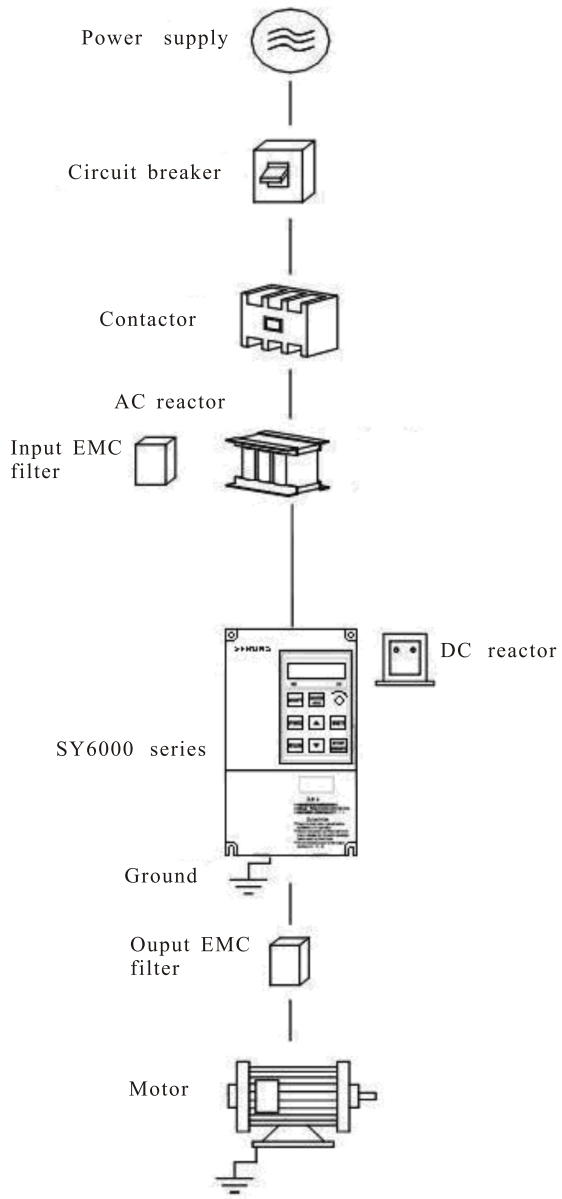


Figure 3-1 Wiring with peripheral equipments

3.2 Wiring diagram

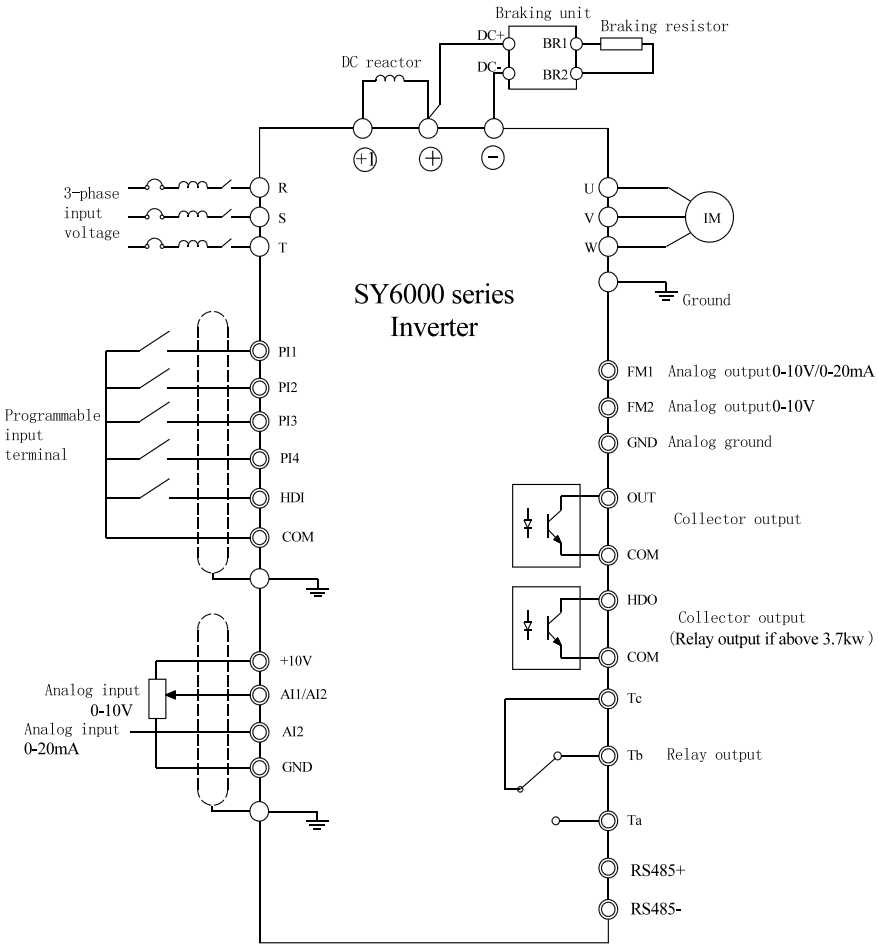


Figure 3-2 Wiring diagram

3.3 Composition of terminals

Terminals of the inverter include terminals of control circuit and terminals of main circuit:

●Terminals of main circuit

① Input power-supply: R (L_1) , S (L_2) , T

② Ground terminal: ⏚

③ External braking unit connection terminal: ⊕ , ⊖

④ Braking resistor connection terminal: ⊕ , PB

⑤ DC reactor connection terminal: ⊕ , +1

⑥ Motor wiring: U, V, W

●Terminals of control circuit

① Analog input: AI1, AI2, GND

② Switch input: PI1, PI2, PI3, PI4, HDI, COM

③ Switch output: Ta, Tb, Tc, TA1, TB1, TC1

④ Open collector output: OUT, HDO, COM

⑤ Analog output: FM1, FM2, GND

⑥ Power port: +10V—GND, +24V—COM

⑦ Communication interface: 485+, 485-

3.3.1 Terminals of main circuit

3.3.1.1Terminals of main circuit

L1		L2

U	V	W	PB	⊕	⊖		⏚

1.5~2.2kW Terminals of main circuit (1PH 220V)

R	S	T

U	V	W	PB	⊕	⊖		⏚

G0.75~2.2kW (P2.2~3.7kW)

Terminals of main circuit (3PH 380V)

PB	⊕	⊖	R	S	T	U	V	W	⏚

G3.7kW (P5.5kW) Terminals of main circuit (3PH 380V)

R	S	T	⊕	PB	⊖	U	V	W	⏚

G5.5~15kW (P7.5~18.5kW)

Terminals of main circuit (3PH 380V)

R	S	T	⊕	⊕1	⊖	⏚	U	V	W

G18.5~110kW (P022~132kW)

Terminals of main circuit (3PH 380V)

⏚	R	S	T	U	V	W	⊕	⊕1	⊖

G132~400kW (P160~400kW)

Terminals of main circuit (3PH 380V)

3.3.1.2 Functions of main circuit terminals

Table 3-1 Functions of main circuit terminals

Terminal name	Function description
R (L_1) , S (L_2) , T	AC power-supply input terminal: connect 3PH AC power supply (R, S, T) (3PH 380V series) or 1PH AC power supply (L_1, L_2) (1PH 220V series)
U, V, W	Output terminals of the inverter, connected to 3PH AC motor
⊕, ⊖	Connect with braking unit connection terminals or use for the inverter tests, ⊕, ⊖ respectively are anode and cathode of DC bus
⊕, ⊕1	⊕, ⊕1 are DC reactor terminals of main circuit, usually short circuit
⊕, PB	Between PB and ⊕ is wiring terminal of braking resistor.
⏚	Ground terminal, earth connection

3.3.1.3Wire size and terminal of main circuit

Wire size of main circuit and terminal bolts, as shown in Table 3-2.

Adopts 450/750V plastic cable as the wire.

Table 3-2 Terminal, bolt and wire section area

Model no.	Terminal sign	Bolt	Wire section area (mm^2)
SY6000-G1D522	L1,L2,U,V,W, PB,⊕,⊖,⏚	M4	2.5
SY6000-G2D222		M4	4
SY6000-G0D740	R,S,T, U,V,W, PB,⊕,⊖,⏚	M4	1.5
SY6000-G1D540/P2D240		M4	2.5
SY6000-G2D240/P3D740		M4	2.5
SY6000-G3D740/P5D540	PB,⊕,⊖,R,S,T, U,V,W,⏚	M4	4
SY6000-G5D540/P7D540	R,S,T,⊕,PB,⊖, U,V,W,⏚	M5	6
SY6000-G7D540/P01140		M5	6
SY6000-G01140/P01540		M5	10
SY6000-G01540/P01840		M5	10
SY6000-G01840/P02240	R,S,T, ⊕,⊕1,⊖,⏚, U,V,W	M6	16
SY6000-G02240/P03040		M6	16
SY6000-G03040/P03740		M6	25
SY6000-G03740/P04540		M8	25
SY6000-G04540/P05540		M8	35
SY6000-G05540/P07540		M8	35
SY6000-G07540/P09040		M10	50
SY6000-G09040/P11040		M10	70
SY6000-G11040/P13240		M10	70
SY6000-G13240/P16040	⏚,R,S,T, U,V,W, ⊕,⊕1,⊖	M12	120
SY6000-G16040/P18540		M12	120
SY6000-G18540/P20040		M12	120
SY6000-G20040/P22040		M12	150
SY6000-G22040/P25040		M12	185
SY6000-G25040/P28040		M12	240
SY6000-G28040/P31540		M12	240
SY6000-G31540/P35040		M12	300
SY6000-G35040/P40040		M12	300
SY6000-G40040		M12	400

3.3.2 Wiring of main circuit

3.3.2.1 Wiring at input side of main circuit

1. Circuit breaker

It is necessary to connect a circuit breaker which is compatible with the capacity of the inverter between 3ph AC power supply and power input terminals (R, S, T). The capacity of breaker is 1.5~2 times to the rated current of the inverter. For details, see <Specifications of Breaker, Cable, and Contactor>.

2. Contactor

In order to cut off the input power effectively when something is wrong in the system, contactor should be installed at the input side to control the ON-OFF of the main circuit power supply.

3. Input AC reactor

In order to prevent the rectifier damage result from the large current, AC reactor should be installed at the input side. It can also prevent rectifier from sudden variation of power voltage or harmonic generated by phase-control load.

4. Input EMC filter

The surrounding device may be disturbed by the cables when the inverter is working. EMC filter can minimize the interference. Just like the following figure.

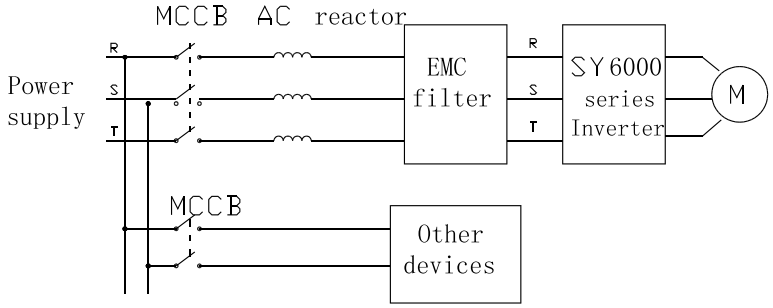


Figure 3-3 Wiring at the input side

3.3.2.2 Wiring at inverter side of main circuit

1. DC reactor

Inverters from 185kW to 400kW have built-in DC reactor which

can improve the power factor. DC reactors are options for inverters from 18.5kW to 160kW. (Please write down your request when place an order.)

2. Braking unit and braking resistor

Inverter of 15kW and below have built-in braking unit. In order to dissipate the regenerative energy generated by dynamic braking, the braking resistor should be installed at ⊕ and PB terminals. The wire length of the braking resistor should be less than 5m.

Inverter of 18.5kW and above need connect external braking unit which should be installed at ⊕ and ⊖ terminals. The cable between inverter and braking unit should be less than 5m. The cable between braking unit and braking resistor should be less than 10m.

The temperature of braking resistor will increase because the regenerative energy will be transformed to heat. Safety protection and good ventilation is recommend.

Note

1. Be sure that the electric polarity of ⊕ ⊖ terminals is right.
2. It is not allowed to connect ⊕ with ⊖ terminals directly. Otherwise damage or fire could occur.

3.3.2.3 Wiring at motor side of main circuit

When confirms forward command, the motor whether is forward running. If the motor is forward running, any two wires of output terminals of the inverter can be exchanged, and then the motor rotation can be changed. Jog function can be used to confirm forward and reverse.

1. Output reactor

When the distance between inverter and motor is more than 50m, inverter may be tripped by over-current protection frequently because of the large leakage current resulted from the parasitic capacitance with ground. And the same time to avoid the damage of motor insulation, the output reactor should be installed.

2. Output EMC filter

EMC filter should be installed to minimize the leakage current caused by the cable minimize the radio noise caused by the cables between the inverter and cable. Just see the following figure.

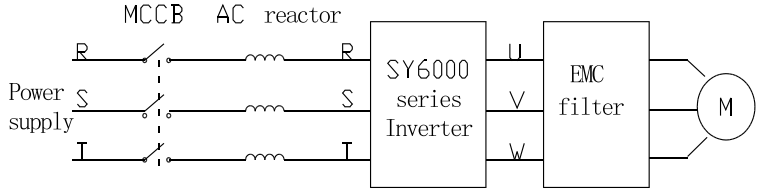


Figure 3-4 Wiring at motor side

3.3.2.4 Wiring of regenerative unit

Regenerative unit is used for putting the electricity generated by braking of motor to the grid. Compared with traditional 3 phase inverse parallel bridge type rectifier unit, regenerative unit uses IGBT so that the total harmonic distortion (THD) is less than 4%. Regenerative unit is widely used for centrifugal and hoisting equipment.

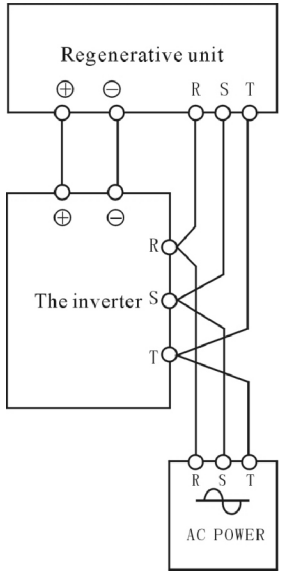


Figure 3-5 Regenerative unit wiring diagram

3.3.2.5 Wiring of common DC bus

Common DC bus method is widely used in the paper industry and chemical fiber industry which need multi-motor to coordinate. In these applications, some motors are in driving status while some others are in regenerative braking (generating electricity) status. The regenerated energy is automatically balanced through the common DC bus, which means it can supply to motors in driving status. Therefore the power consumption of whole system will be less compared with the traditional method (one inverter drives one motor). When two motors are running at the same time (i.e. winding application), one is in driving status and the other is in regenerative status. In this case the DC buses of these two inverters can be connected in parallel so that the regenerated energy can be supplied to motors in driving status whenever it needs. Its detailed wiring is shown in the following figure:

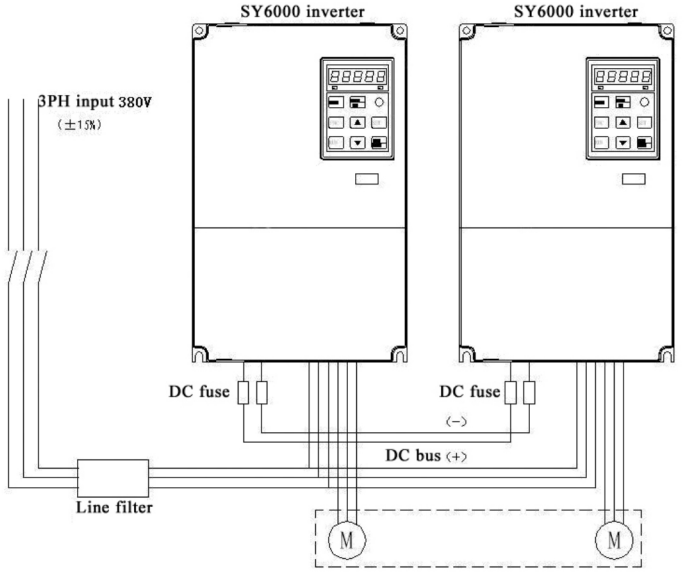


Figure 3-6 Wiring of common DC bus

Note Two inverters must be the same model when connected with common DC bus method. Be sure they are powered on at the same time.

3.3.2.6 Ground wiring (PE)

1. In order to ensure safety and prevent electrical shock and fire, terminal PE ⏚ must be grounded with ground resistance. 220V class grounding resistance ≤100Ω, 380V class grounding resistance ≤10Ω.
2. The ground wire should be big and short, and it is better to use copper wire (>3.5mm²).
3. Do not share grounding wire with welding machines or power equipments.
4. In order to avoid loop, we suggest don't use common grounding wire. Correct and wrong methods of grounding is shown in Figure3-7.

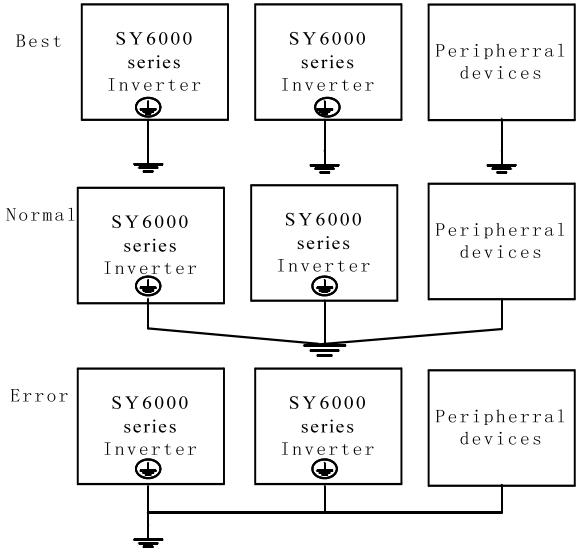


Figure 3-7 Connection method of grounding wire

3.3.2.7 Precautions of main circuit wiring

Note

1. Do not connect power line with output terminal. Inverter interior will damage if connect output terminal with input power supply.

2. Do not short circuit or ground output terminal. Otherwise it will be risk of electric shock or short-circuit.
3. Do not use phase-shift capacitor to connect with output circuit. Otherwise it will damage the inverter.
4. Please use carefully electromagnetic switch on output side of main circuit. Do not use electromagnetic switch directly to start or stop the motor. Otherwise surge current of the inverter will make current protection act or damage inverter interior.

3.3.3 Terminals of control circuit

3.3.3.1Terminals of control circuit

PI1	PI2	PI3	PI4	+24V	HDI	+10V	AI1	FM1	485+
Ta	Tb	Tc	OUT	COM	HDO	GND	AI2	FM2	485-

G1.5～2.2kW (P3.7kW) Wiring terminal figure of control circuit

PI1	PI2	PI3	PI4	+24V	HDI	+10V	AI1	FM1	485+
Ta	Tb	Tc	OUT	COM	COM	GND	AI2	FM2	485-

TA1	TB1	TC1

G3.7~400kW (P5.5~400kW) Wiring terminal figure of control circuit

3.3.3.2 Description of terminals of control circuit

Category	Terminal sign	Terminal description
Analog input	AI1	Voltage range: 0～10V; Input resistance: 10kΩ
	AI2	Voltage (0～10V) /current (0～20mA) are optional through J6; Input resistance:10kΩ (voltage input) /500Ω (current input)
	GND	＋10V reference zero potential (GND and COM are isolated.)
Switch input	PI1~PI4	Form opt coupler isolation input with COM; Input voltage range: 9～30V; input resistance: 3.3kΩ
	HDI	Form opt coupler isolation input with COM; Pulse input frequency range: 0～50kHz; Input voltage range: 9～30V; Input resistance: 1.1kΩ
	COM	+24V common port

Switch output	Ta	Relay output, Tc common port, Tb normally closed, Ta normally open; contact capacity: AC250V/3A, DC30V/1A
	Tb	
	Tc	
	TA1	TC1 common port, TB1 normally closed, TA1 normally open; contact capacity: AC250V/3A, DC30V/1A (3.7kW or above)
	TB1	
	TC1	
Open collector output	OUT	Open collector output terminal, its corresponding common port is COM; Above 3.7kW: HDO is relay output Rated 24V, enable output 50mA
	HDO	
Analog output	FM1	FM1 can choose voltage or current output through jumper J7; FM2 means voltage output. Output range: Voltage (0～10V) /current (0～20mA)
	FM2	
Power supply	+10V	+10V power supply
	+24V	+24V power supply (current: 150mA)
Commu-nication interface	485+	485 Communication interface, 485 differential signal positive and negative sides. Standard 485 communication interface, please use twisted pair wire or shield wire.
	485-	

3.3.3.3 Wire size of control circuit and press line terminal

Wire size of control circuit and terminal bolt size are as shown below

Terminal bolt	Wire section area (mm^2)	Wire type	Bolt torque (N·m)
M3.5	0.5~2	Stranded shield wire	0.8

3.3.4 Wiring of control circuit

Note Precautions of control circuit wiring:

1. Use shielded or twisted-pair cables to connect control terminals.
2. It is suggested to apply perpendicular wiring to prevent inverter malfunction caused by external interference. Connect the ground terminal (PE) with shield wire.
3. The cable connected to the control terminal should leave away from the main circuit and heavy current circuits (including power supply cable, motor cable, relay and contactor connecting cable) at least 20cm and parallel wiring should be avoided.

3.3.5 Jumper terminal instruction

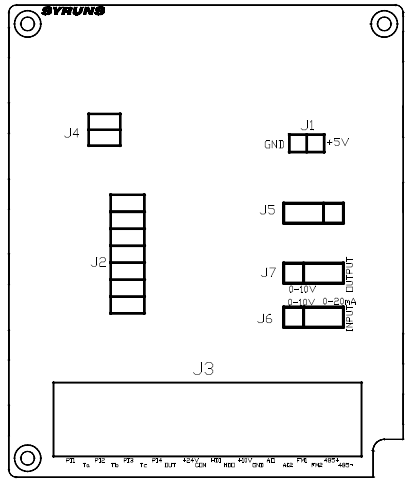


Figure 3-4 Diagram of jumper terminal position of control board

Terminal sign	Terminal usage and description	Terminal default location
J1	Use for factory debugging	—
J2	Factory programmable port	—
J3	Please refer to 3.3.3 Terminals of control circuit	—
J5	Communication terminal resistor jumper	—
J4	Use for factory debugging	—
J6	Input switchover jumper: Voltage (0～10V) /current (0～20mA)	Voltage (0～10V)
J7	Output switchover jumper: Voltage (0～10V) /current (0～20mA)	Voltage (0～10V)

3.4 Specification of circuit breaker, contactor and reactor

3.4.1 Specification of circuit breaker and contactor

Model no.	Circuit breaker (A)	Rated current of Contactor (A)
SY6000-G1D522	25	16
SY6000-G2D222	25	16
SY6000-G0D740	16	10

Model no.	Circuit breaker (A)	Rated current of Contactor (A)
SY6000-G1D540/P2D240	16	10
SY6000-G2D240/P3D740	16	10
SY6000-G3D740/P5D540	25	16
SY6000-G5D540/P7D540	25	16
SY6000-G7D540/P01140	40	25
SY6000-G01140/P01540	63	32
SY6000-G01540/P01840	63	50
SY6000-G01840/P02240	100	63
SY6000-G02240/P03040	100	80
SY6000-G03040/P03740	125	95
SY6000-G03740/P04540	160	120
SY6000-G04540/P05540	200	135
SY6000-G05540/P07540	200	170
SY6000-G07540/P09040	250	230
SY6000-G09040/P11040	315	280
SY6000-G11040/P13240	400	315
SY6000-G13240/P16040	400	380
SY6000-G16040/P18540	630	450
SY6000-G18540/P20040	630	500
SY6000-G20040/P22040	630	580
SY6000-G22040/P24540	800	630
SY6000-G24540/P28040	800	700
SY6000-G28040/P31540	1000	780
SY6000-G31540/P35040	1200	900
SY6000-G35040/P40040	1280	960
SY6000-G40040	1380	1035

3.4.2 Specification of input/output AC reactor and DC reactor

Model no.	Input AC reactor		Output AC reactor		DC reactor	
	Current (A)	Inductance (mH)	Current (A)	Inductance (mH)	Current (A)	Inductance (mH)
SY6000-G0D740	2.5	8.4	2.5	4.7	3	25

Model no.	Input AC reactor		Output AC reactor		DC reactor	
	Current (A)	Inductance (mH)	Current (A)	Inductance (mH)	Current (A)	Inductance (mH)
SY6000-G1D540/P2D240	5	4.2	5	2.36	5.7	11
SY6000-G2D240/P3D740	7.5	2.8	7.5	1.57	6	11
SY6000-G3D740/P5D540	10	2.1	10	1.18	12	6.3
SY6000-G5D540/P7D540	15	1.4	15	0.80	23	3.6
SY6000-G7D540/P01140	20	1.06	20	0.60	23	3.6
SY6000-G01140/P01540	30	0.71	30	0.40	30	2.1
SY6000-G01540/P01840	40	0.53	40	0.30	33	1.9
SY6000-G01840/P02240	50	0.42	50	0.24	40	1.3
SY6000-G02240/P03040	60	0.35	60	0.20	50	1.08
SY6000-G03040/P03740	76	0.276	76	0.155	65	0.78
SY6000-G03740/P04540	90	0.234	90	0.13	78	0.72
SY6000-G04540/P05540	120	0.175	120	0.10	95	0.54
SY6000-G05540/P07540	150	0.14	150	0.078	115	0.45
SY6000-G07540/P09040	190	0.11	190	0.062	160	0.36
SY6000-G09040/P11040	210	0.10	210	0.056	180	0.33
SY6000-G11040/P13240	250	0.084	250	0.047	250	0.26
SY6000-G13240/P16040	290	0.073	290	0.04	300	0.2
SY6000-G16040/P18540	330	0.064	330	0.036	350	0.17
SY6000-G18540/P20040	400	0.048	400	0.03	400	0.12
SY6000-G20040/P22040	440	0.043	440	0.027	440	0.11
SY6000-G22040/P24540	490	0.039	490	0.024	490	0.1
SY6000-G24540/P28040	530	0.036	530	0.022	550	0.09
SY6000-G28040/P31540	600	0.032	600	0.02	600	0.08
SY6000-G31540/P35040	660	0.029	660	0.018	700	0.0683
SY6000-G35040/P40040	800	0.024	800	0.015	900	0.0566
SY6000-G40040	800	0.024	800	0.015	900	0.0566

3.4.3 Specification of input/output filters

Model no.	Model no. of input filter	Model no. of output filter
	SY920 series	SY960 series
SY6000-G0D740	SY920-5	SY960-5
SY6000-G1D540/P2D240	SY920-5	SY960-5
SY6000-G2D240/P3D740	SY920-8	SY960-8
SY6000-G3D740/P5D540	SY920-8	SY960-8
SY6000-G5D540/P7D540	SY920-16	SY960-16
SY6000-G7D540/P01140	SY920-16	SY960-16
SY6000-G01140/P01540	SY920-30	SY960-30
SY6000-G01540/P01840	SY920-30	SY960-30
SY6000-G01840/P02240	SY920-45	SY960-45
SY6000-G02240/P03040	SY920-45	SY960-45
SY6000-G03040/P03740	SY920-75	SY960-75
SY6000-G03740/P04540	SY920-75	SY960-75
SY6000-G04540/P05540	SY920-100	SY960-100
SY6000-G05540/P07540	SY920-120	SY960-120
SY6000-G07540/P09040	SY920-150	SY960-150
SY6000-G09040/P11040	SY920-200	SY960-200
SY6000-G11040/P13240	SY920-300	SY960-300
SY6000-G13240/P16040	SY920-300	SY960-300
SY6000-G16040/P18540	SY920-300	SY960-300
SY6000-G18540/P20040	SY920-420	SY960-420
SY6000-G20040/P22040	SY920-420	SY960-420
SY6000-G22040/P24540	SY920-420	SY960-420
SY6000-G24540/P28040	SY920-500	SY960-500
SY6000-G28040/P31540	SY920-500	SY960-500
SY6000-G31540/P35040	SY920-630	SY960-630
SY6000-G35040/P40040	SY920-800	SY960-800
SY6000-G40040	SY920-800	SY960-800

3.5 EMC guideline

Like other electric devices, the inverter is a electromagnetic interference source. In order to reduce or eliminate external interference from the inverter, please follow above correct wiring, and select the following measures according to actual situations on site:

3.5.1Treatment of conducted interference

1. Noise filter of power supply side can restrain inverter's noise and power supply noise. Need executive input noise filter for the inverter.
2. Isolate noise from other devices by using insulating transformer or power filter.
3. Check whether the peripheral devices and inverter constitute a closed loop.

3.5.2Treatment of radio frequency interference (RFI)

1. Place easy-effective devices and signal lines far away from the inverter. Use shield wire as signal line, shield layer into ground, signal line into metal tube, and far away from the inverter and input, output lines. If signal cable must cross power cable, keep them orthogonal.
2. Connect output line into the metal tube. Ensure the distance between the output line and signal line is more than 30cm and the distance between metal tubes is at least 20mm.
3. Install dedicated radio noise filter and linear noise filter (ferrite common mode chokes) on the output side of the inverter, so it can restrain radiation noise of power line.
4. Avoid signal line parallel wiring with power line or in bundles with power line.
5. Be shielded by iron containers. The connection cable between the inverter and the motor is the shorter the better.

Chapter 4 Keypad operation

4.1 Keypad instruction

4.1.1 Keypad diagram

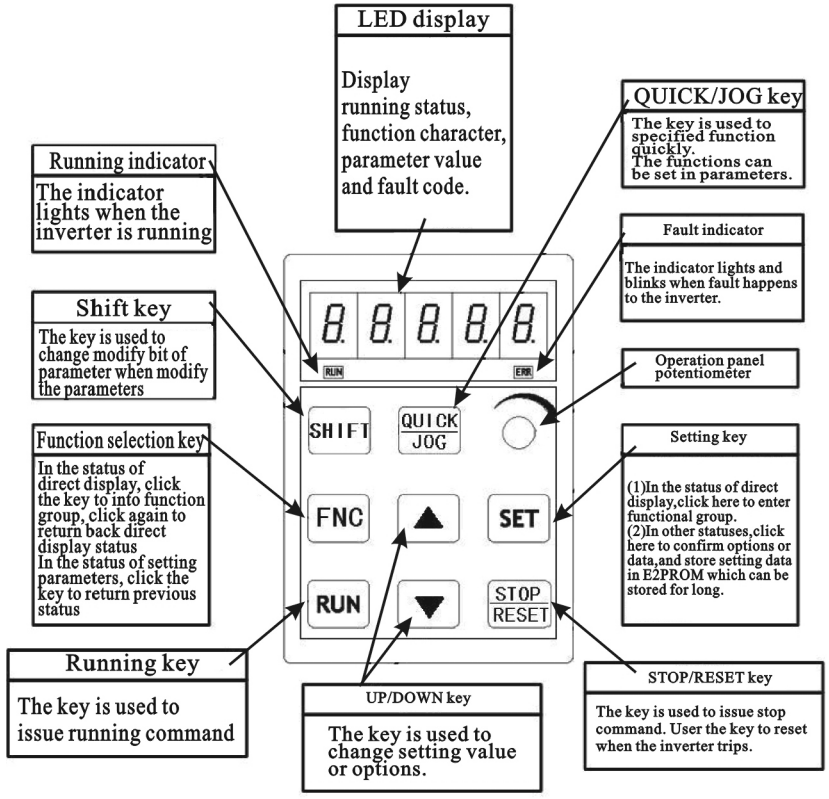


Figure 4-1 Name and instruction of keypad

Display format: There is a 5-digit 8-section LED monitor on the keypad, which is used for displaying running status, function code, parameter value and fault code.

Keypad operation**:** Function of keys are as shown in Figure 4-1.

4.1.2 Key function instruction

Key sign	Name	Function description
FNC	Function key	First menu, enter or quit
SET	Set key	Enter menu step by step, and set parameters
SHIFT	Shift key	Shift right loop and select display parameter sunder stop display and running display; may choose modification position of parameters when modify parameters.
QUICK JOG	Quick / jog key	Function of the key is determined by function code FA.03. 0: Jog running 1: Forward reverse switchover key 2: Clear settings of UP/DOWN 3: Quick debugging mode 1 (debug according to fixed menu) 4: Quick debugging mode 2 (debug according to recent sequence) 5: Quick debugging mode 3 (debug according to not default parameter)
▲	Up key	Increase of data or function code
▼	Down key	Decrease of data or function code
RUN	Run key	Use for running operation under keypad operation
STOP RESET	Stop / reset key	Press this key stop running operation when under running; the function code is restricted by FA.04. Use this key to reset all control modes when under fault alarm status.
SET + QUICK JOG	Combination key	Shift left loop and select display parameters under stop display and running display. Press SET firstly, and press QUICK/JOG later.
RUN + STOP RESET	Combination key	Press RUN and STOP RESET together, then coast to stop

4.1.3 Indicator instruction

1) Function indicator instruction:

Indicator name	Indicator instruction
RUN	Running indicator: green RUN indicator lights when AC is in the status of running
ERR	Error indicator: red ERR indicator lights when the inverter happens fault or error.

2) Digital display zone:

5-digit LED display can display kinds of monitoring data and alarm codes such as setting frequency, output frequency and so on.

4.2 Keypad basic operation

4.2.1 Direct display status

Direct display status of SY6000 series inverter refers to initial display mode after power-on, which is used for displaying output frequency of inverter.

4.2.2 Display parameter's switchover

In the status of direct display, we can view or modify parameters by keypad operation. Firstly determine display code of parameters, locate its function group, and then operate as per the following sequence.

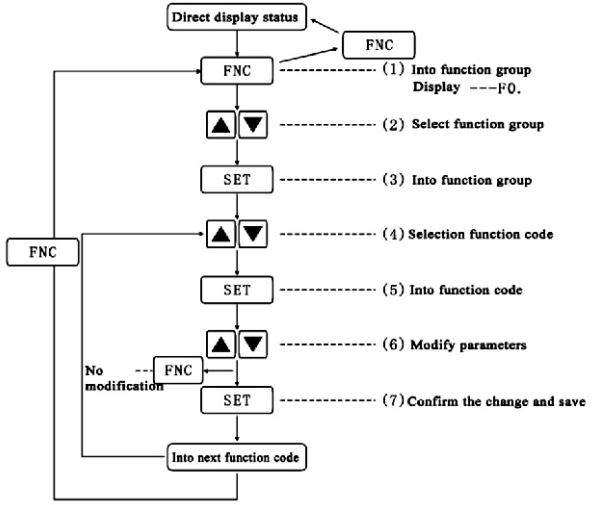


Figure 4-2 Parameter setting operation procedure

E.g.: Modify function code F1.01 from 0 to 2:

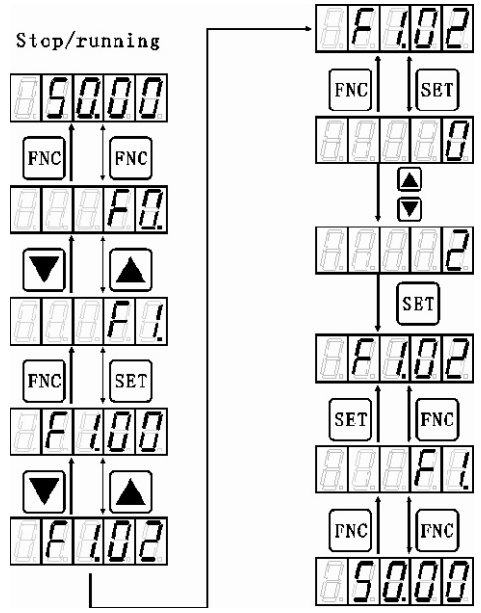


Figure 4-3 Example of function code modification setting

4.3 Quick menu

Quick menu provides a shortcut way to view and modify function parameters. SY6000 series inverter provided three kinds of quick menu. The inverter provides three quick menus to select by FA.03.

4.3.1 Quick menu operation

Quick menu has two levels of menus, which are corresponding to the second-level and the third-level menus of general menu, and has no corresponding with first-level menu.

Note

In stop or run status, press QUICK/JOG to enter the quick first-level menu, use "▲" or "▼" to select different shortcut parameter, and then press SET quick second-level menu. The method to modify parameter at the quick second-level menu is the same as that at the general third-level menu. If want to return to last display, press QUICK/JOG.

4.3.2 Quick debugging mode

4.3.2.1 Quick debugging mode 1

By setting FA.03 to be 3, the user can select quick debugging mode 1. This parameter is set by factory and the parameter setting is in the following table.

Table of quick debugging parameter

No.	Function code	Name	Description	Setting range	Factory setting
1	F1.00	Keypad setting frequency	0.00 Hz～F0.01	0.00～F0.01	50.00Hz
2	F0.04	Acc time 0	0.0～3600.0s	0.0～3600.0	Depend on model
3	F0.05	Dec time 0	0.0～3600.0s	0.0～3600.0	Depend on model
4	F0.00	Running setting channel	0: Keypad running 1: Terminal running 2: Communication running	0～2	0
5	F1.01	Main frequency command selection	0: Keypad 1: AI1 2: AI2 3: HDI 4: Simple PLC 5: Multi-step speed 6: PID 7: Communication 8: Potentiometer	0～8	0
6	F3.06	Carrier frequency	1.0～10.0kHz	1.0～10.0	Depend on model
7	F3.09	V/F curve	0: Linear curve 1: Multi-point V/F curve 2:1.3th power torque V/F curve 3:1.7th power torque V/F curve 4:2.0th power torque V/F curve	0～4	0
8	F3.07	Torque boost	0 (auto) , 0.1～10.0%	0.0～10.0	0.0%

No.	Function code	Name	Description	Setting range	Factory setting
9	F2.00	Start mode	0: Start directly 1: DC braking and re-start	0～1	0
10	F2.06	Stop mode	0: Dec stop 1: Coast to stop	0～1	0
11	Fb.02	Rated motor frequency	0.01Hz～F0.01	0.01～F0.01	50.00HZ
12	Fb.04	Rated motor voltage	0～460V	0～460	Depend on model

4.3.2.2 Quick debugging mode 2

By setting FA.03 to be 4, the user can select quick debugging mode 2. In this mode, debugging and setting are conducted according to the latest modified parameters. The inverter automatically records functional parameters that the user accesses and modifies after power on. The recording sequence is the sequence in which the user accesses the parameters. The latest accessed parameter is saved in the foremost place of the quick menu, and the earliest accessed parameter is saved in the backmost place of the quick menu. The length of the quick menu buffer can support the storage of 16 parameters. If the number of recorded parameters exceeds 16, the earliest recorded parameters will be deleted. Press QUICK/JOG to enter quick debugging mode. Its debugging mode is as described in Section 4.3.1. If no parameter is modified after power on, press QUICK/JOG, the screen will display “NULLP”, indicating that the shortcut parameter is null.

4.3.2.3 Quick debugging mode 3

By setting FA.03 (QUICK/JOG) to be 5, the user can select quick debugging mode 3. In this mode, after the user press QUICK/JOG, the inverter will automatically search current parameters that are different from default values, and the parameters will be saved in the quick debugging menu according to the sequence of the function codes for the user to view and set. The length of the quick menu buffer can support the storage of 16 parameters. If the number of recorded parameters exceeds 16, only the first 16 difference function codes are saved in the quick debugging menu. Press QUICK/JOG to enter quick debugging mode. If “ NULLP” is displayed after pressing QUICK/JOG, it indicates that all the current parameters are the same as the default parameters.

Chapter 5 Parameter instruction

Note Before setting functions, please enter into Fd.00 to select inverter model. For details, please refer to description of Group Fd.

Group F0 Basic function

Function code	Name	Setting range
F0.00	Running setting selection	0~2【0】

Select control command source of the inverter. Control command includes: start, stop, forward, reverse, jog, fault reset and so son.

0: Keypad command source;

Execute running command control by RUN on the keypad. Press STOP/RESET to execute running command control. If set QUICK/JOG key as FWD/REV (FA.03=1) switching function, change rotating direction by the key. In running status, pressing RUN and STOP/RESET in the same time will cause the inverter coast to stop.

1: Terminal command source;

Running command control by forward, reverse, forward jog, reverse jog of input terminal.

2: Communication command source;

Running command is controlled by upper PC through communication method.

Function code	Name	Setting range
F0.01	Highest output frequency	F0.02~600.00【50.00Hz】

It is highest output frequency of the inverter. It is the foundation of frequency setting and the foundation of increasing and decreasing frequency.

Function code	Name	Setting range
F0.02	Output frequency upper limit	F0.03~F0.01【50.00Hz】

It is upper limit value of inverter output frequency. The value should≤ Highest output frequency.

Function code	Name	Setting range
F0.03	Output frequency lower limit	0.00~F0.02【0.00Hz】

It is lower limit value of inverter output frequency.

To select through function code F2.12 (lower limit frequency mode). Acts when reference frequency is lower than lower limit frequency: run at lower limit frequency, stop or sleep.

Highest output frequency≥ upper limit frequency≥ lower limit frequency.

Function code	Name	Setting range
F0.04	Acc time 0	0.1~3600.0s 【Depend on model】
F0.05	Dec time 0	0.1~3600.0s 【Depend on model】

Acc time means the acceleration time which the inverter boosts from 0Hz to highest output frequency (F0.01).

Dec time means the deceleration time which the inverter boosts from highest output frequency (F0.01) to 0Hz.

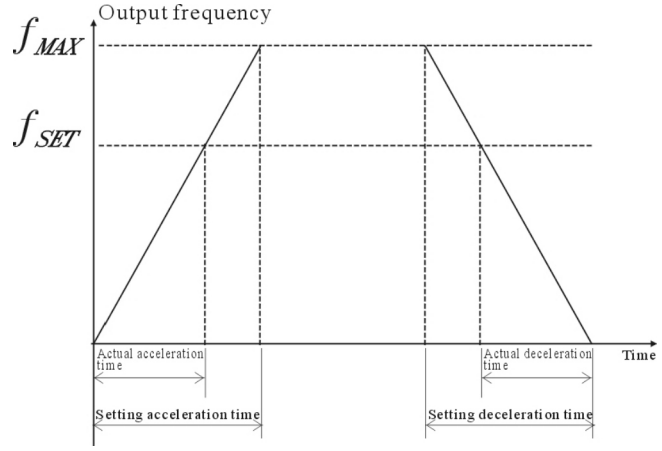


Figure 5-1 Acc/dec time

When reference frequency equals highest frequency, actual acc/dec time and given acc/dec time are correspondence match.

When reference frequency is less than highest frequency, actual acc time is smaller than given acc/dec time.

Actual acc/dec time = given acc/dec time × (reference frequency/ highest frequency). There are four groups of acc/dec time of SY6000 series inverter

First group: F0.04, F0.05; Second group: F6.00, F6.01;

Third group: F6.02, F6.03; Fourth: F6.04, F6.05.

Select acc/dec time by select terminal combination of multi-function digital input terminal.

Function code	Name	Setting range
F0.06	Rated power of the inverter	0.75~400.0 【Depend on model】
F0.07	Rated current of the inverter	0.0~760.0 (Depend on model】

Rated power rating and rated current of the inverter, view only.

Function code	Name	Setting range
F0.08	Function parameter initialization	0~2【0】

0: No action

1: The inverter will restore factory setting.

2: The inverter will clear recent fault records.

After operation of selected function is completed, the function code will automatically restore to0.

Group F1 Frequency setting

Function code	Name	Setting range
F1.00	Keypad reference frequency	0.00~F0.01【50.00Hz】

When main frequency command is "Keypad setting", the function code value is initial value of frequency digital setting of the inverter.

Function code	Name	Setting range
F1.01	Main frequency command	0~8【0】

Select input source of main frequency command of the inverter, there are 9 sources of main given frequency:

0: Keypad

Reach keypad reference frequency through modifying "Keypad reference frequency" value of function code F1.00.

1: AI1

2: AI2

The reference frequency is set by analog input. SY6000 series inverter provides 2 analog input terminals. AI1 is 0~10V voltage input terminal, while AI2 is 0~10V voltage input or 0~20mA current input. Voltage input or current input of AI2 can be selected by Jumper J6.

Note

When AI2 is set as 0~20mA current input, the corresponding voltage is 10V.

100% of AI is corresponding to highest frequency (F0.01), -100.0% of AI is corresponding to reverse highest frequency (F0.01) .

3: HDI

The reference frequency is set by high-speed pulse input. SY6000 series inverter provides 1 high-speed pulse input terminal (HDI) .

Pulse voltage: 15~30V, pulse frequency range: 0.0~50.0kHz.

100% of pulse input is corresponding to highest frequency, -100.0% of pulse input is corresponding to reverse highest frequency.

Note

1) High speed pulse can only be input through HDI.

2) Set HDI as high-speed pulse input (F4.00=0), and function selection of HDI is "setting input" (F4.19=0) .

4: Simple PLC

Select this frequency setting mode, and the inverter will run at simple PLC program. User can set reference frequency, running direction, acc/dec time through setting Group F9 "Simple PLC and multi-speed control group".

5: Multi-step speed

Select this frequency setting mode, and the inverter will run at multi-step speed mode. User can set reference frequency through setting parameters of Group F4 and Group F9.

Note

1) Multi-step speed mode will enjoy priority in setting reference frequency if F1.01 is not set to be setting of multi-step speed. In this case, only step 1 to step 15 are available.

2) If F1.01 is set to be setting of multi-step speed, step 0 to step 15 can be realized.

3) Jog has highest priority.

6: PID

The reference frequency is the result of PID adjustment. For details, please refer to description of Group F8 .

7: Communication

The frequency command is given by upper PC through communication mode.

8: Potentiometer

Frequency command is set by keypad potentiometer.

Function code	Name	Setting range
F1.02	Auxiliary frequency command	0~2【0】
F1.03	Object reference of auxiliary frequency command	0~1【1】

F1.02:

0: AI1

1: AI2

2: HDI

Auxiliary frequency command can act as the independent reference frequency source. Its usage is the same of main frequency command.

F1.03:

0: Highest output frequency

100% input setting of auxiliary frequency command is corresponding to highest frequency.

1: Main frequency command

100% input setting of auxiliary frequency command is corresponding to setting value of main frequency command source.

Note

AI2 can provide input of 0~10V or 0~20mA. When select 0~20mA as input, corresponding voltage of 20mA is 10V.

Function code	Name	Setting range
F1.04	Frequency command selection	0~3【0】

0: Main

1: Auxiliary

2: Main+Auxiliary

3: Highest (Main, auxiliary): If main frequency is bigger than auxiliary frequency, set main frequency as reference frequency. Otherwise, set auxiliary frequency as reference frequency.

Select frequency given source through this parameter.

(0, 1, 2) selection can switch over through terminal function (Group F4).

Function code	Name	Setting range
F1.05	Keypad and terminal UP/DOWN setting	0~2【0】

This parameter can be used to select the reference frequency command.

0: Valid, memory when power down.

1: Valid, no memory when power down.

2: Invalid.

Note When use operate factory setting again, frequency value of keypad and UP/DOWN function setting will zero clear.

Function code	Name	Setting range
F1.06	Jog output frequency	0.00~F0.01【5.00Hz】
F1.07	Acc time of jog running	0.1~3600.0s【Depend on model】
F1.08	Dec time of jog running	0.1~3600.0s【Depend on model】

Define frequency and acc/dec time when jog running. Operate direct start mode and dec stop mode during jog running.

Acc time of jog running means the time that the inverter accelerates from 0Hz to highest output frequency (F0.01).

Dec time of jog running means the time that the inverter decelerates from highest output frequency (F0.01) to 0Hz.

Function code	Name	Setting range
F1.09	Jump frequency 1 lower limit	F1.10~F0.01
F1.10	Jump frequency 1 upper limit	0.00~F1.09
F1.11	Jump frequency 2 lower limit	F1.12~F0.01
F1.12	Jump frequency 2 upper limit	0.00~F1.11

When reference frequency is in the range of jump frequency, actual output frequency will run at the border of jump frequency.

Make the inverter avoid mechanical resonance of the load through setting jump frequency. The inverter can set two jump frequencies. If both jump frequencies are set to 0, this function doesn't work.

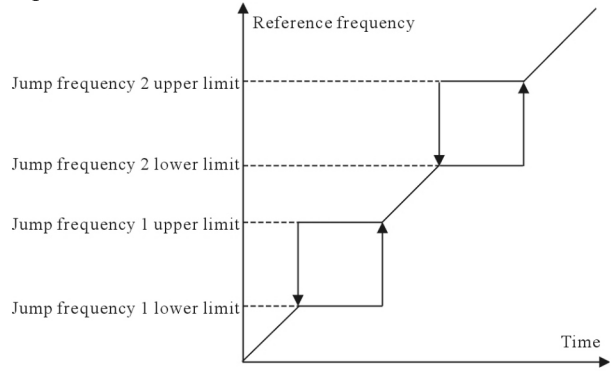


Figure 5-2 Jump frequency

Group F2 Start and stop control

Function code	Name	Setting range
F2.00	Start running mode	0~1【0】

0: Start directly: Start the motor at the starting frequency.

1: DC braking and start: DC braking (set F2.03, F2.04), the start the motor at the starting frequency. It is suitable for the motor which have small inertia load and may reverse rotation when start.

Function code	Name	Setting range
F2.01	Direct-start start frequency	0.00~10.00【0.00Hz】
F2.02	Start frequency hold time	0.0~50.0s【0.0s】

- Setting proper starting frequency can increase the starting torque.
- If the reference frequency is less than starting frequency, inverter will be at stand-by status.
- The starting frequency could be less than the lower frequency limit.
- F2.03 and F2.04 take no effect during FWD/REV switching.

Function code	Name	Setting range
F2.03	DC braking current before start	0.0~150.0%【0.0%】
F2.04	DC braking time before start	0.0~50.0s【0.0s】

F2.03: Increasing DC current when DC braking before start is percentage of rated current of the inverter.

F2.04: DC braking is invalid if set DC braking time to 0 during DC braking. The bigger DC braking current, the bigger braking force.

Function code	Name	Setting range
F2.05	Acc/dec mode selection	0~1【0】

Frequency mode selection during start and running:

0: linear type. Output frequency increase or reduce by linear

1: Reserved

Function code	Name	Setting range
F2.06	Stop mode	0~1【0】

0: Dec stop. When the stop command takes effect, the inverter decreases the output frequency according to F2.05 and the selected acc/dec time till stop.

1: Coast to stop. When the stop command takes effect, the inverter blocks the output immediately. The motor coasts to stop by its mechanical inertia.

Function code	Name	Setting range
F2.07	Stop braking start frequency	0.00~50.00【0.00Hz】
F2.08	Stop braking waiting time	0.0~50.0s【0.0s】
F2.09	Stop DC braking current	0.0~150.0%【0.0%】
F2.10	Stop DC braking time	0.0~50.0s【0.0s】

Starting frequency of DC braking: Start the DC braking when output frequency reaches start frequency determined by F2.07.

Waiting time before DC braking: Inverter blocks the output before starting the DC braking. After this waiting time, the DC braking will be started. It is used to prevent over-current fault caused by DC braking at high speed.

DC braking current: The value of F2.09 is the percentage of rated current of inverter. The bigger the DC braking current, the greater the braking torque.

Stop DC braking time: Constant time when DC braking

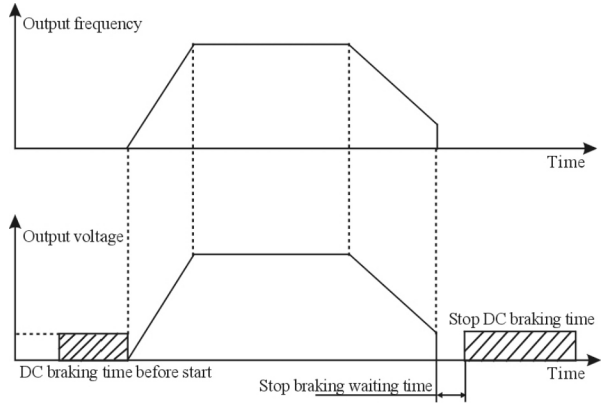


Figure 5-3 DC braking diagram

Function code	Name	Setting range
F2.11	Forward reverse dead time	0.0~3600.0s【0.0s】

Set the hold time at zero frequency in the transition between forward and reverse running. It is shown as following figure:

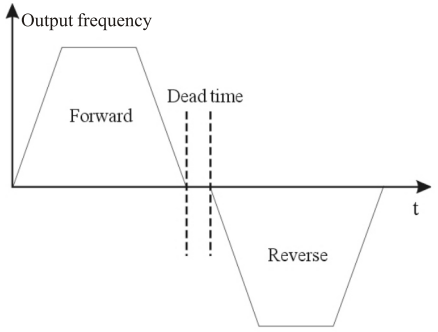


Figure 5-4 Forward reverse dead time

Function code	Name	Setting range
F2.12	Lower limit frequency mode	0~2【0】

This function code is used to confirm running status of inverter when reference frequency is less than lower limit frequency.

0: Running at lower limit frequency

1: Stop

2: Stand-by. The inverter coast to stop when reference frequency is less than lower limit frequency; the inverter will run automatically when reference frequency is more than or equal to lower limit frequency.

Note

The function is valid only when lower limit frequency is bigger than 0.

Function code	Name	Setting range
F2.13	Power-off restart selection	0~1【0】
F2.14	Restart waiting time	0.0~3600.0s【0.0s】

F2.13:

0: Disabled restart. Inverter will not automatically restart when power on again until run command takes effect.

1: Enabled restart. The inverter will restore automatically previous running status when the inverter power off and power on again.

Note

The function is only used to 7.5kW or above inverters. The function may cause the inverter restart automatically, please be cautious.

Function code	Name	Setting range
F2.15	Terminal function detection selection when power on	0~1【0】

0: Terminal running command is invalid when power on.

1: Terminal running command is valid when power on.

Caution

Please select carefully this function. It may cause serious consequence.

Group F3 Auxiliary running function

Function code	Name	Setting range
F3.00	Running direction selection	0~2【0】

0: Run at default direction: Run at actual direction after the inverter power on.

1: Run at reverse direction: Modifying this function code to change motor rotating direction.

Caution

After parameters initializing, motor rotating direction will restore previous status. Please don't use to the occasion that forbid changing motor rotating direction after the system adjusts completely.

2: Reverse run prohibited: Reverse run of the inverter is prohibited. It is suitable for specified situations.

Function code	Name	Setting range
F3.01	PWM type selection	0~1【0】

Provide fixed and random PWM type selection:

0: Fixed PWM, noise and frequency of the motor is fixed.

1: Random PWM can restrain effectively the motor noise, but will increase harmonics.

Function code	Name	Setting range
F3.02	Carrier frequency adjustment selection	0~1【0】

0: Carrier frequency doesn't adjust with temperature: Carrier frequency is fixed at setting of F3.06.

1: Carrier frequency adjusts with temperature: When temperature increases, the inverter automatically reduces carrier frequency; When temperature decreases, carrier frequency increases. This function can effectively prevent frequent alarming with over-heat faults.

Function code	Name	Setting range
F3.03	Automatic voltage regulator function	0~2【1】

0: Disabled

1: Enabled all the time

2: Only disabled when deceleration

When the function of automatic voltage regulation is invalid, output voltage will change with input voltage (or DC bus voltage).

When the function of automatic voltage regulation in valid, output voltage will no change with input voltage (or DC bus voltage).

Output voltage will remain stability in the range of output capacity.

Function code	Name	Setting range
F3.04	V/F slip compensation limit	0.00~200.0%【0.00%】

The parameter can compensate motor speed change because of with load when V/F control, improve motor mechanical hardness, 100% correspond to rated slip frequency.

Function code	Name	Setting range
F3.05	Energy-saving running selection	0~1【0】

0: No action

1: Auto energy-saving run

When the motor is running at constant speed with light load or no load, we achieve the purpose of energy-saving through the inverter detect load current and adjust output voltage.

Note The function are particularly effective for fan and pump loads.

Function code	Name	Setting range
F3.06	Carrier frequency setting	1.0~10.0 【Depend on model】

Figure 5-5 The environmental impact of carrier frequency

Carrier frequency	Electromagnetic noise	Noise, leakage current	Cooling degree
1kHz	↑ High	↑ Low	↑ Low
6kHz			
10kHz	↓ Low	↓ High	↓ High

Relation table between model no. and carrier frequency

Model no.	Carrier frequency factory setting
0.75~11kW	6kHz
15~55kW	4kHz
75kW~185kW	3kHz
200kW or above	2kHz

Advantages of high carrier frequency: ideal current waveform; less

current harmonics; low motor noise;

Disadvantages of carrier frequency: increasing switching loss, increasing inverter temperature; inverter output is effected; derate to use the inverter at high frequency; finally, increasing leakage current of the inverter will increase external electromagnetic interference.

Low carrier frequency is contrary to the above. Too low carrier frequency will cause unstable running, decreasing torque and even agitation.

Before out of factory, the factory set rational setting to carrier frequency. In general, users don't need to change the parameters.

Derate to use the inverter when carrier frequency is higher than factory setting. Derate 20% every increasing 1kHz carrier frequency.

Function code	Name	Setting range
F3.07	Torque boost	0.0~10.0【0.0%】

Torque boost is mainly used for under cutoff frequency (F3.08). V/F curve after boosting is as shown as following figure. Torque boost can improve low frequency torque characteristics of V/F.

Select appropriate torque according to the load. The load can increase boost, but the boost value could not be too great.

When torque boost is set to 0.0%, the inverter will automatically torque boost.

Torque boost cutoff point: Torque boost if effective under this frequency point; torque boost is not effective over this reference frequency.

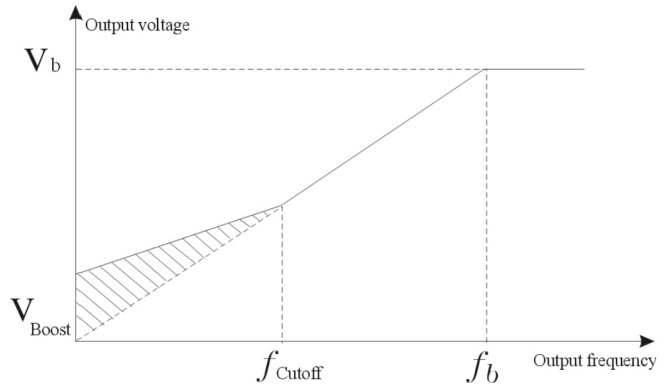


Figure 5-6 Manual torque boost

Function code	Name	Setting range
F3.08	Torque boost cutoff point	0.0%~50.0%【20.0%】

Function description refer to F3.07.

Function code	Name	Setting range
F3.09	V/F curve	0~4【0】

0: Linear curve.
1: Multi-point V/F curve. Preset (F3.10~F3.15) to define V/F curve.
2~4: Multiple power V/F curve. Suitable for fan and pump loads.

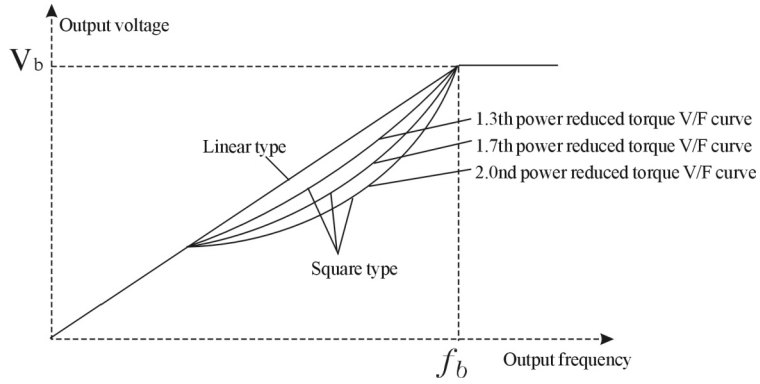


Figure 5-7 V/F curve

Function code	Name	Setting range
F3.10	V/F frequency point 1	0.00~F3.12【5.00Hz】
F3.11	V/F voltage point 1	0.0%~100.0%【10.0%】
F3.12	V/F frequency point 2	F3.10~F3.14【30.00Hz】
F3.13	V/F voltage point 2	0.0%~100.0%【60.0%】
F3.14	V/F frequency point 3	F3.12~Fb.02【50.00Hz】
F3.15	V/F voltage point 3	0.0%~100.0%【100.0%】

F3.07~F3.12 corresponding to several V/F curve.
Setting of V/F curve is set by load characteristics of the motor.

Note

V1＜V2＜V3, f1＜f2＜f3. The motor will be overheat or damaged if voltage setting at low frequency is too high, and the inverter may over-current stall or over-current protection.

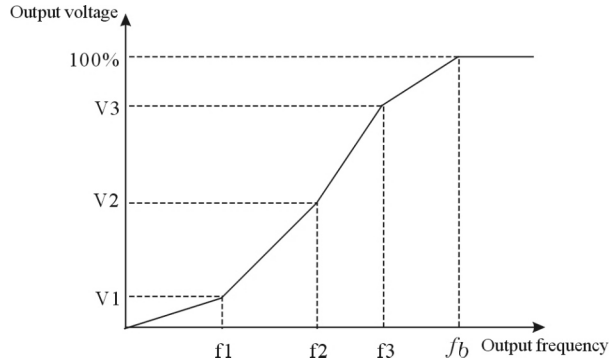


Figure 5-8 V/F curve

Function code	Name	Setting range
F3.16	PWM mode	0~1【0】

0: PWM mode 1, this mode is normal PWM mode, less motor noise at low frequency, more motor noise at high frequency.

1: PWM mode 2, less motor noise at this mode, but higher temperature boost. Please derate to use the inverter if user select this function.

Group F4 Input terminals

Function code	Name	Setting range
F4.00	HDI input type selection	0~1【0】

0: High-speed pulse input

Function code	Name	Setting range
F4.01	PI1 terminal function	0~39【1】
F4.02	PI2 terminal function	0~39【4】
F4.03	PI3 terminal function	0~39【7】
F4.04	PI4 terminal function	0~39【0】
F4.05	HDI terminal switch input function	0~39【0】

The group parameters is used to set corresponding function of digital multi function input terminal.

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
When running command source is terminal control, running

command of the inverter is determined by above terminal function.

3: 3-wire operation control

3-wire control input terminal , please refer to description of F4.07.

4:Jog forward

5: Jog reverse

For detailed jog frequency and acc/dec time, please refer to description of F1.06~F1.08.

6: Coast to stop

After the command is effective, the inverter blocks output immediately, but stop process of the motor is not controlled by the inverter. For big inertia load and no requirement to stop time, it is suggested to adopt this method. The method is same as description of F2.08.

7: Fault reset

External fault reset function, which is used to long-distant fault reset, is as the same as the function of STOP/RST on the keypad.

8: Running pause

Frequency inverter dec stop, but all running parameter is at memory status, such as PLC parameters, traverse parameters, PID parameters.

After disappearance of this signal, the inverter will resume running to the status before stop.

9: External fault input

After this signal is effective, the inverter reports external fault (EF) and Stop.

10: UP command

11: DOWN command

The reference frequency of inverter can be adjusted by UP command and DOWN command

12: Clear UP/DOWN, use this terminal to clear UP/DOWN setting.

13: Switch between main and auxiliary setting

14: Switch between main and main + auxiliary setting

15: Switch between auxiliary and main + auxiliary setting

16: Multi-step speed reference 1

17: Multi-step speed reference 2

18: Multi-step speed reference 3

19: Multi-step speed reference 4

16 steps speed control can be realized by the combination of these four terminals. For details, please refer to: Multi-step speed reference terminals status and according step value table.

Note

Multi-step speed reference 1 is low bit, Multi-step speed reference 4 is

high bit.

Multi-step speed 4	Multi-step speed 3	Multi-step speed 2	Multi-step speed 1
BIT3	BIT2	BIT1	BIT0

20: Multi-step speed pause

Keep current step unchanged no matter what the input status of four multi-step terminals is.

21, Acc/dec time selection 1

22: Acc/dec time selection 2

4 groups of acc/dec time can be selected by the combination of these two terminals.

Terminal 2	Terminal 1	Acc/dec time selection	Corresponding parameter
OFF	OFF	Acc/dec time 0	F0.04/F0.05
OFF	ON	Acc/dec time 1	F6.00/F6.01
ON	OFF	Acc/dec time 2	F6.02/F6.03
ON	ON	Acc/dec time 3	F6.04/F6.05

23: Simple PLC reset

When simple PLC stops, the status of PLC such as running step, running time and output frequency will be cleared when this terminal is enabled..

24: Simple PLC pause

Inverter runs at zero frequency and PLC pauses the timing when this terminal is enabled. If this terminal is disabled, inverter will start and continue the PLC operation from the status before pause.

25: PID control pause

PID adjustment will be paused and inverter keeps output frequency unchanged.

26: Pause traverse operation

Inverter keeps output frequency unchanged. If this terminal is disabled, inverter will continue traverse operation from current frequency.

27: Reset traverse operation

Reference frequency of the inverter returns to central frequency

28: Counter reset

Clear the value of counter

29: Length reset

Clear the value of actual length

30: Acc/dec ramp hold

Pause acceleration or deceleration and maintain output frequency.

31: Counter input

The pulse input terminal of internal counter. Highest pulse frequency: 200Hz.

32~39: Reserved

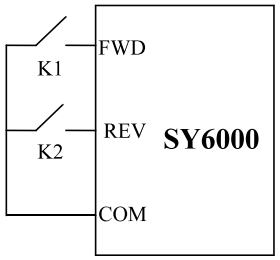
Function code	Name	Setting range
F4.06	ON-OFF filter time	1~10【5】

This parameter is used to set filter time of terminals (PI1~PI4, HDI). When interference is heavy, user should increase this value to prevent malfunction.

Function code	Name	Setting range
F4.07	Terminal control running mode	0~3【0】

This parameter defines four different control modes that control the inverter operation through external terminals.

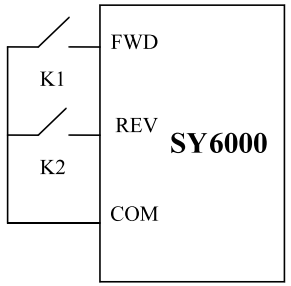
0: 2-wire control mode 1: Integrate START/STOP command with run direction



K1	K2	Running command
OFF	OFF	Stop
ON	OFF	FWD
OFF	ON	REV
ON	ON	Stop

Figure 5-9 2-wire control mode 1

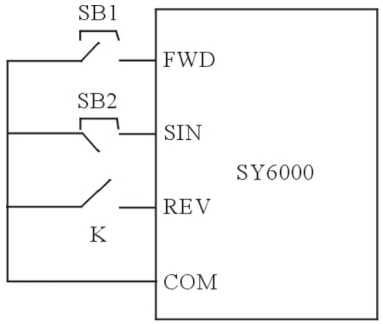
1: 2-wire control mode 2, START/STOP command is determined by FWD terminal. Run direction is determined by REV terminal.



K1	K2	Run command
OFF	OFF	Stop
ON	OFF	FWD
OFF	ON	Stop
ON	ON	REV

Figure 5-10 2-wire control mode 2

2: 3-wire control mode 1.



K	Run command
OFF	FWD
ON	REV

Figure 5-11 3-wire control mode 1

K: Run direction button

SB1: Start button

SB2: Stop button (NC)

Terminal Sin is the multi-functional terminal of PI1~PI4 and HDI. The terminal function should be set to be 3 (3-wire control).

3: 3-wire control mode 2.

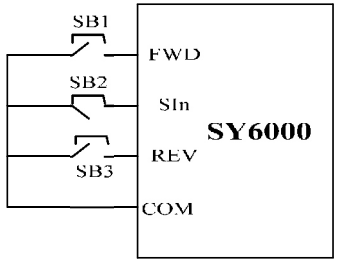


Figure 5-12 3-wire control mode 2

K: Run direction button
SB1: Start button
SB2: Stop button (NC)

Terminal Sin is the multi-functional terminal of PI1~PI4 and HDI. The terminal function should be set to be 3 (3-wire control).

Note

When 2-wire control mode is active, the inverter will not run in following situation even if FWD/REV terminal is enabled:

- Coast to stop (press RUN and STOP/RST at the same time).
- Stop command from serial communication.
- FWD/REV terminal is enable before power on. Please refer to description of FA.04 .

Function code	Name	Setting range
F4.08	UP/DOWN setting change rate	0.01~50.00Hz/s【0.50Hz/s】

This parameter is used to determine how fast UP/DOWN setting changed.

Function code	Name	Setting range
F4.09	AI1 lower limit	0.00~10.00V【0.00V】
F4.10	AI1 lower-limit corresponding setting	-100.0~100.0【0.0%】
F4.11	AI1 upper limit	0.00~10.00V【10.00V】
F4.12	AI1 upper-limit corresponding setting	-100.0~100.0【100.0%】
F4.13	AI1 filter time constant	0.00~10.00s【0.10s】

These parameters determine the relationship between analog input voltage and the corresponding setting value. When the analog input voltage exceeds the range between lower limit and upper limit, it will be regarded as the upper limit or lower limit.

The analog input AI1 can only provide voltage input, and the range is 0V~10V. For different applications, the corresponding value of 100.0% analog setting is different.

Note For details, please refer to description of each application.

AI1 lower limit must be less or equal to AI1 upper limit.

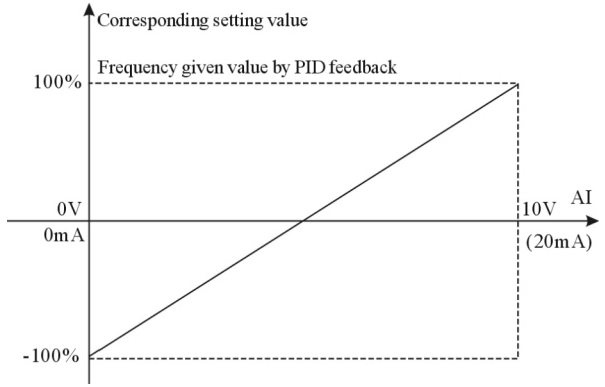


Figure 5-13 Relationship between AI and corresponding setting

AI1 filter time constant is effective when there are sudden changes or noise in the analog input signal. Responsiveness decreases as the setting increases.

Function code	Name	Setting range
F4.14	AI2 lower limit value	0.00~10.00V【0.00V】
F4.15	AI2 lower-limit corresponding setting	-100.0~100.0【0.0%】
F4.16	AI2 upper limit value	0.00~10.00【10.00V】
F4.17	AI2 upper-limit corresponding setting	-100.0~100.0【100.0%】
F4.18	AI2 input filter time	0.00~10.00s【0.10s】

Please refer to description of AI1. AI2 provides 0~10V/0~20mA input. When AI2 is set as 0~20mA input, the corresponding voltage range is 10V.

Function code	Name	Setting range
F4.19	HDI high-speed pulse input function selection	0~2【0】

F4.19 Functions of high-speed pulse input:
0: Reference input, such as frequency, PID setting and PID feedback.
1: Length input: the input of length pulse
2: High-speed count input: If the count pulse frequency is too high to use PI1~PI4, it is necessary to use HDI.

Function code	Name	Setting range
F4.20	HDI lower limit frequency	0.000~50.000kHz 【0.000kHz】
F4.21	HDI lower limit frequency corresponding setting	-100.0~100.0【0.0%】
F4.22	HDI upper limit frequency	0.000~50.000kHz 【50.000kHz】
F4.23	HDI upper limit frequency corresponding setting	-100.0~100.0【100.0%】
F4.24	HDI frequency input filter time	0.00~10.00s【0.10s】

These functions are similar to functions of AI1 and AI2.

Group F5 Output parameters

Function code	Name	Setting range
F5.00	OUT collector output selection	0~20【1】
F5.01	HDO output selection (1.5~2.2kW) Relay output TA1, TB1, TC1 (3.7kW or above)	0~20【4】
F5.02	Relay output selection	0~20【0】

Output functions are as shown in below table :

0: No output. Output terminal has no function

1: Running. ON: Run command is ON or voltage is being output.

2: Run forward. ON: During forward run.

3: Run reverse. ON: During reverse run.

4: Fault output. ON: Inverter is in fault status.

5: FDT reached. Please refer to description of F6.21, F6.22.

6: Frequency reached. Please refer to F6.23.

7: Zero speed running. ON: The output frequency of inverter is zero.

8: Preset count value reached. Please refer to description of F6.18.

9: Specified count value reached. Please refer to description of F6.19.

10: Length reached. ON: Actual length reach the value of F6.12.

11: Simple PLC step completed. After simple PLC completes one step, inverter will output ON signal for 500ms.

12: Simple PLC cycle completed. After simple PLC completes one cycle, inverter will output ON signal for 500ms.

13: Running time reached. ON: The accumulated running time of inverter reaches the value of F6.20.

14: Upper limit frequency reached. ON: Output frequency reached the value of upper limit frequency (F0.05).

15: Lower limit frequency reached. ON: Output frequency reached

the value of lower limit frequency (F0.06).

16: Ready. ON: Inverter is ready (no fault, power is ON).

17: Auxiliary motor 1 started

18: Auxiliary motor 2 start

In the case of simple water supply system with one inverter driving three pumps, it is used to control auxiliary pumps. For details, please refer to description of F6.25, F6.26, F6.27.

19~20: Reserved

Note For 1.5~2.2kW there is 1 relay output. For 3.7kW and above, there are 2 relay output.

Function code	Name	Setting range
F5.03	FM1 output selection	0~12【0】
F5.04	FM2 output selection	0~12【0】

Standard output of analog output is 0~20mA (or 0~10V). Select current/voltage output through jumper J5.

FM1/FM2 output functions are indicated in the following table:

Settings	Name	Range
0	Output frequency	0~highest output frequency (F0.04)
1	Reference frequency	0~highest output frequency (F0.04)
2	Motor speed	0~2nd power rated motor speed
3	Output current	0~2nd power rated current of the inverters
4	Output voltage	0~1.5th power rated voltage of the inverters
5	Output power	0~2nd power rated power
6	Output torque	0~2nd power rated motor current
7	AI1 voltage	0~10V
8	AI2 voltage/current	0~10V/0~20mA
9	HDI frequency	0.1Hz~50.000kHz
10	Length value	0~preset length (F6.12)
11	Count value	0~presetting count value (F6.18)
12	Reserved	Reserved

Function code	Name	Setting range
F5.05	FM1 lower limit	-100.0~100.0【0.0%】
F5.06	FM1 lower limit corresponding output	0.00~10.00V【0.00V】

Function code	Name	Setting range
F5.07	FM1 output upper limit	-100.0~100.0【100.0%】
F5.08	FM1 upper limit corresponding output	0.00~10.00V【10.00V】

These parameters determine the relationship between analog output voltage/current and the corresponding output value. When the analog output value exceeds the range between lower limit and upper limit, it will output the upper limit or lower limit.

When FM1 is current output, 1mA is corresponding to 0.5V.

For different applications, the corresponding value of 100.0% analog output is different. For details, please refer to description of each application.

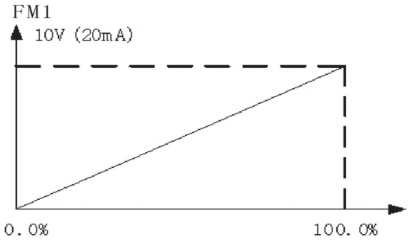


Figure 5-14 Relationship of corresponding setting and analog output

Function code	Name	Setting range
F5.09	FM2 output lower limit	-100.0~100.0【0.0%】
F5.10	FM2 lower limit corresponding output	0~10V
F5.11	FM2 output upper limit	-100.0~100.0【100.0%】
F5.12	FM2 upper limit corresponding output	0~10V

Corresponding relation of output is similar to FM1, as shown in Figure 5-14.

Group F6 Enhanced function

Function code	Name	Setting range
F6.00	Acc time 1	0.1~3600.0s 【Depend on model】
F6.01	Dec time 1	0.1~3600.0s 【Depend on model】
F6.02	Acc time 2	0.1~3600.0s 【Depend on model】
F6.03	Dec time 2	0.1~3600.0s 【Depend on model】
F6.04	Acc time 3	0.1~3600.0s 【Depend on model】
F6.05	Dec time 3	0.1~3600.0s 【Depend on model】

For details, please refer to description of F0.04 and F0.05.

Function code	Name	Setting range
F6.06	Traverse amplitude	0.0~100.0%【0.0%】
F6.07	Jump frequency amplitude	0.0~50.0%【0.0%】
F6.08	Traverse rise time	0.1~3600.0s【5.0s】
F6.09	Traverse fall time	0.1~3600.0s【5.0s】

Traverse operation is widely used in textile and chemical fiber industry. The typical application is shown in following figure.

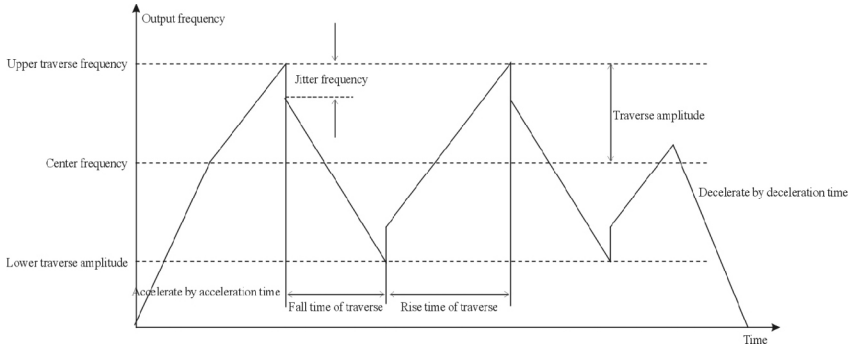


Figure 5-15 Diagram of traverse running

Center frequency (CF) is reference frequency

Traverse amplitude (AW):= center frequency×F6.06.

Jitter frequency= traverse amplitude (AW)×F6.07.

Traverse rise time: Indicate the time rising from the lowest traverse frequency to the highest traverse frequency.

Traverse fall time: Indicate the time falling the highest traverse frequency to the lowest traverse frequency.

Function code	Name	Setting range
F6.10	Auto reset times	0~9【0】
F6.11	Reset internal time	0.1~100.0s【1.0s】

Auto reset function can reset the fault in preset times and internal. When F6.10 is set to be 0, it means “auto reset” is disabled and the protective device will activated in case of fault. 1~8: try reset 1~8times; 9: always try reset.

Function code	Name	Setting range
F6.12	Preset length	0~65535m【0】
F6.13	Actual length	0~65535m【0】

Function code	Name	Setting range
F6.14	Number of pulse per cycle	1~10000【1】
F6.15	Perimeter of shaft	0.01~100.00cm【10. 00】
F6.16	Ratio of length	0.001~10.000【1.000】
F6.17	Coefficient of length correction	0.001~1.000【1.000】

The inverter inputs counting pulses via HDI and calculate length according to the number of pulses per cycle (F6.14) and perimeter of shaft (F6.15). The formula is as below:

Calculated length= (Number of pulses / number of pulse per cycle) × perimeter of shaft.

The calculated length can be corrected through ratio of length (F6.16) and coefficient of length correction (F6.17), and the result is the actual length.

Actual length= (calculated length × ratio of length) /coefficient of length correction

When actual length (F6.13) ≥ preset length (F6.12), the inverter will send STOP command to stop the inverter. When the inverter restarts, it needs to clear or modify the actual length (F6.13) , otherwise the inverter will not start.

Function code	Name	Setting range
F6.18	Preset count value	F6.19~65535【0】
F6.19	Specified count value	0~F6.19【0】

The count pulse input source can be PI1~PI4（≤200Hz) and HDI.

If function of output terminal is set as preset count reached, when the count value reached preset count value (F6.18), it will output an ON-OFF signal. Inverter will clear the counter and restart counting.

If function of output terminal is set as specified count reached, when the count value reaches specified count value (F6.19), it will output an ON-OFF signal until the count value reached preset count value (F6.18). Inverter will clear the counter and restart counting.

Note

Specified count value (F6.19) should not be greater than preset count value (F6.18).

This function is shown as following figure

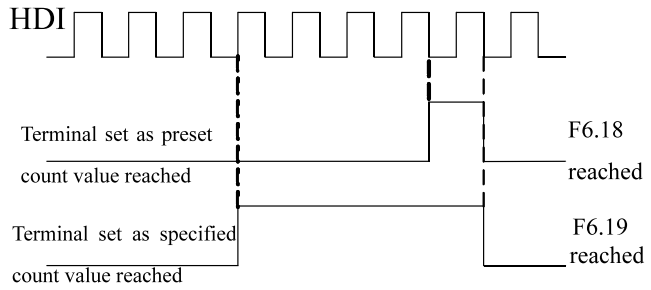


Figure 5-16 Timing chart for preset and specified count reached

Function code	Name	Setting range
F6.20	Setting running time	0~65535h【65535h】

If function of output terminal is set as running time reached, when the accumulated running time reaches the preset running time, it will output an ON-OFF signal.

Function code	Name	Setting range
F6.21	FDT level	0.00~F0.01【50.00Hz】
F6.22	FDT lag	0.0~100.0【5.0%】

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

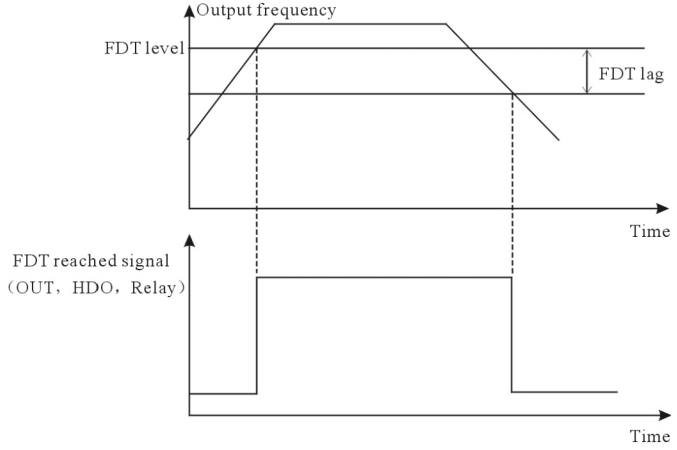


Figure 5-17 FDT level and lag

Function code	Name	Setting range
F6.23	Frequency reached detecting range	0.0~100.0%【0.0%】

When output frequency is within he detecting range of reference frequency, and ON-OFF signal will be output.

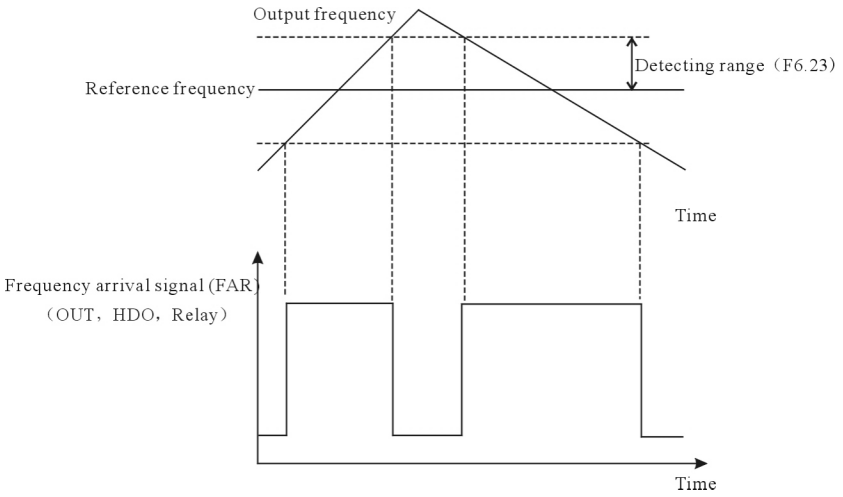


Figure 5-18 Detection of frequency reached

Function code	Name	Setting range
F6.24	Droop control	0.00~10.00Hz【0.00Hz】

When several motors drive the same load, each motor's load is different because of 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 increasing.

When the motor outputs rated torque, actual frequency drop is equal to F6.24. User can between load and output frequency is in the following figure.

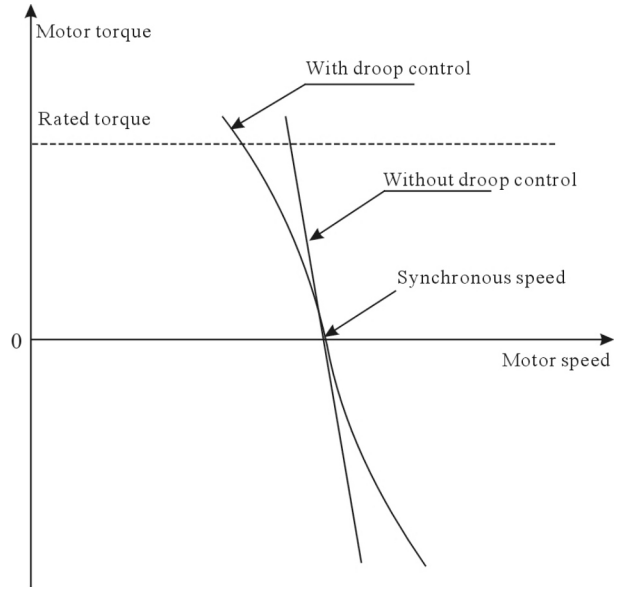


Figure 5-19 Motor characteristics of droop control

Function code	Name	Setting range
F6.25	Auxiliary motor selection	0~3【0】
F6.26	Auxiliary motor 1 START/STOP delay time	0.0~3600.0s【5.0s】
F6.27	Auxiliary motor 2 START/STOP delay time	0.0~3600.0s【5.0s】

F6.25:

0: No auxiliary motor

1: Auxiliary motor 1 is enable

2: Auxiliary motor 2 is enable

3: Both of auxiliary motor 1, 2 are enable

Above parameters are used to realize simple water supply control function which one inverter drives three pumps (one variable frequency pump and two power-frequency pumps). The control logic is shown in the following figure.

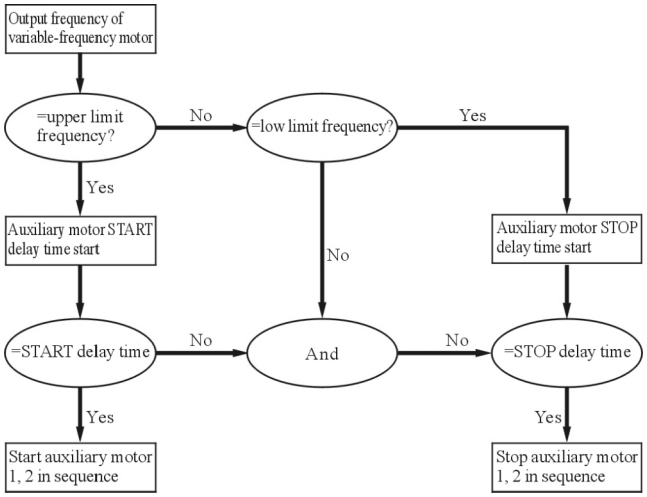


Figure 5-20 Diagram of simple water-supply control function

Function code	Name	Setting range
F6.28	Brake threshold voltage	115.0~140.0%【Depend on model】

When the DC bus voltage is greater than the value of F6.28, the inverter will start dynamic braking.

Function code	Name	Setting range
F6.29	Cooling fan running mode	0~2【0】

0: Auto stop mode: The fan keeps working when the inverter is running. When the inverter stops, whether the fan work or not depends on the internal temperature of inverter.

1: The fan always run when power on.

2: The fan always stop when power on.

Group F7 Protection parameters

Function code	Name	Setting range
F7.00	Output phase failure protection	0~1【1】

0: Protection disable

1: Protection enable

Output phase failure protection: choose whether protect output phase failure.

Function code	Name	Setting range
F7.01	Inverter overload protection selection	0～1【1】

0：Disabled. When the inverter is without overload protection, please use with caution.

1：Enabled. When the inverter runs with overload, the inverter will be heating, and overload protection will be enabled.

Function code	Name	Setting range
F7.02	Inverter overload protection current	20.0～130.0%【100%】

This value is determined by the following formula:

Overload protection current= maximum load current / inverter rated current

Need set this function to protect the inverter when the inverter drives the motor.

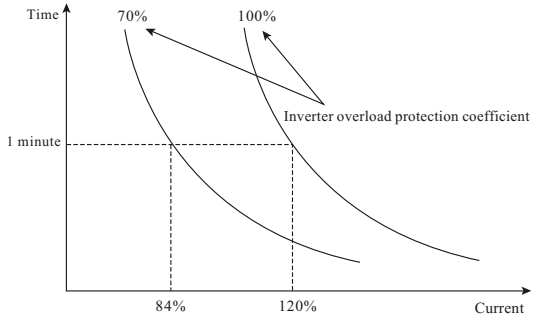


Figure 5-21 (a) Overload protection coefficient of G purpose inverter

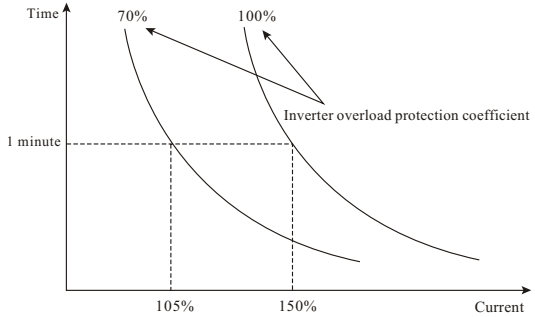


Figure 5-21 (b) Overload protection coefficient of P purpose inverter

Function code	Name	Setting range
F7.03	Motor overload protection	0~2【1】

0: No protection: Without protection of motor overload.

1: For normal motors (with low-speed compensation). The lower the speed, the poorer the cooling effect. Based on this reason, if output frequency is lower than 30Hz, inverter will reduce the motor overload protection threshold to prevent normal motor from overheat.

2: For frequency convention motors (without low-speed compensation). As the cooling effect of variable frequency motor has nothing to do with running speed, it is not required to adjust the motor overload protection threshold.

Function code	Name	Setting range
F7.04	Motor overload protection current	20.0~120.0%【100.0%】

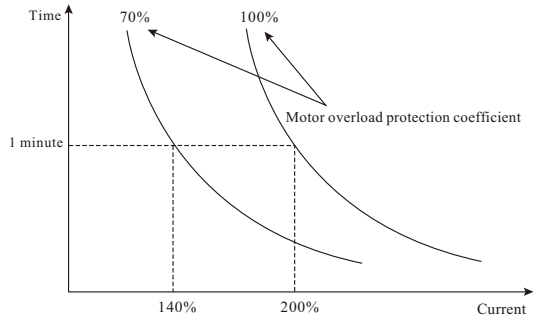


Figure 5-22 Overload protection coefficient of P motor

The value can be determined by the following formula:

Motor overload protection current= (motor rated current / inverter rated current) *100%.

Note

- This parameter is normally used when rated power of inverter is greater than rated power of motor.
- Motor overload protection time: 60s with 200% of rated current. For details, please refer to above figure.

Function code	Name	Setting range
F7.05	Threshold of trip-free	70.0~110.0%【80.0%】
F7.06	Decrease rate of trip-free	0.00Hz~F0.01【0.00Hz】

100% in F7.05 corresponds to standard bus voltage.

If F7.06 is set to be 0, the trip-free function is invalid.

Trip-free function enables the inverter to perform low-voltage compensation when DC bus voltage drops below F7.05. The inverter can continue to run without tripping by reducing its output frequency and feedback and feedback energy via motor.

Note

If F7.06 is too big, the feedback energy of motor will be too large and may cause over-voltage fault. If F7.06 is too small, the feedback energy of motor will be too small to achieve voltage compensation effect. So please set F7.06 according to load inertia and the actual load.

Function code	Name	Setting range
F7.07	Over voltage stall protection	0~1【1】
F7.08	Over voltage stall protection voltage	110.0~150.0% 【Depend on model】

F7.07:

0: Disabled

1: Enabled

F7.08:

380V model factory setting: 130%

220V model factory setting: 120%

During deceleration, the motor's decelerating rate may be lower than that of inverter's output frequency due to the load inertia. At this time, the motor will feed the energy back to the inverter, resulting in DC bus voltage rise. If no measures taken, the inverter will trip due to over voltage.

During deceleration, the inverter detects DC bus voltage and compares it with over-voltage stall protection point. If DC bus voltage exceeds F7.08, the inverter will stop reducing its output frequency. When DC bus voltage become lower than F7.08, the deceleration continues, as shown in following figure.

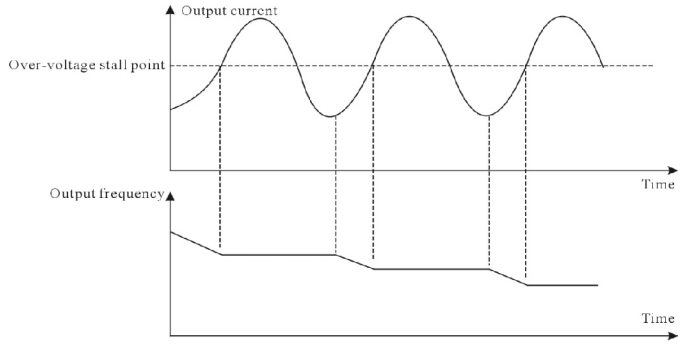


Figure 5-23 Over voltage stall function

Function code	Name	Setting range
F7.09	Auto current limiting threshold	50.0~200.0% 【Depend on model】
F7.10	Frequency decrease rate when current limiting	0.00~100.0 【10.00Hz/s】
F7.11	Auto current limiting selection	0~2【0】

Auto current limiting is used to limit the current of inverter smaller than the value determined by F7.09 in real time. Therefore the inverter will not trip due to surge over-current. This function is especially useful for the applications with big load inertia or step change of load.

F7.09 is a percentage of the inverter's rated current.

F7.10 defines the decrease rate of output frequency when this function is active. If F7.09 is too small, overload fault may occur. If it is too big, the frequency will change too sharply and therefore, the feedback energy of motor will be too large and may cause over-voltage fault. This function is always enabled during acceleration or deceleration. Whether the function is enabled in constant.

F7.11:

0: Enabled

1: Disabled when constant speed

Speed running is determined by F7.11.

Note

- During auto current limiting process, the inverter's output frequency may change; therefore, it is recommended not to enable the function when requires the inverter's output frequency stable.

- During auto current limiting process, if F7.09 is too low, the overload capacity will be impacted.

Please refer to following figure.

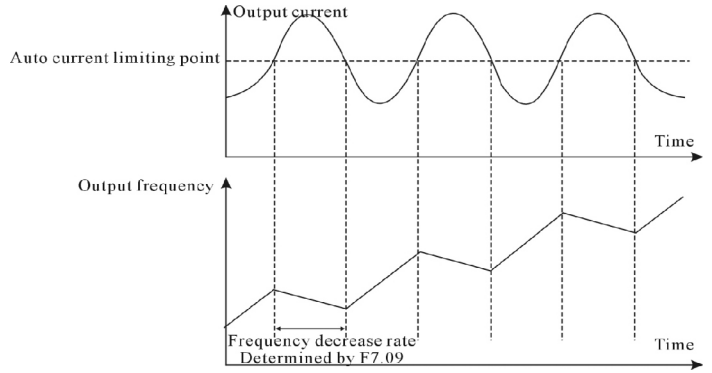


Figure 5-24 Current limiting protection function

Group F8 PID control

PID control is a common used method in process control, such as flow, pressure and temperature control. The principle is firstly 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 diagram.

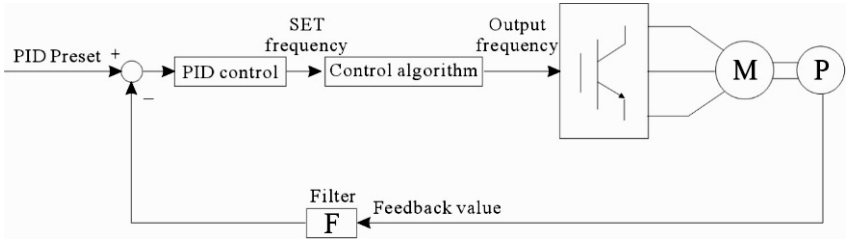


Figure 5-25 PID control diagram

Function code	Name	Setting range
F8.00	PID preset source selection	0~5【0】

0: Keypad
1: AI1
2: AI2
3: HDI
4: Multi-step
5: Communication

To make PID take effect F1.01 must be set to be 6.

Function code	Name	Setting range
F8.01	Keypad preset PID preset	0.0~100.0%【0.0%】

Function code	Name	Setting range
F8.02	PID feedback source	0~4【0】

0: AI1
1: AI2
2: AI1+AI2
3: HDI
4:Communication
Select PID feedback source through this parameter

100% of preset value is corresponding to 100% of feedback value.

Preset value and feedback value of PID are percentage value. 100% of preset value and feedback value is correspondent to 10.0V.

Caution

Preset source and feedback source can not be coincidence, otherwise, PID can not effective control.

Function code	Name	Setting range
F8.03	PID output characteristics	0~1【0】

0: Positive. When the feedback value is greater than the preset value, output frequency will be decreased, such as tension control in winding application.

1: Negative. When the feedback value is greater than the preset value, output frequency will be increased, such as tension control in unwinding application.

Function code	Name	Setting range
F8.04	Proportional gain (Kp)	0.00~100.00【0.10】
F8.05	Integration time (Ti)	0.01~10.00s【0.10s】
F8.06	Differential time (Td)	0.00~10.00s【0.10s】
F8.07	Sampling period (T)	0.00~100.00s【0.10s】
F8.08	PID control bias limit	0.00~100.00%【0.0%】

Sampling period (T) refer to the sampling cycle of feedback value. The PI regulator calculates once in each sampling cycle. The bigger the sampling cycle, the slower the response is.

PID control bias limit defines the maximum bias between the feedback and the preset. PID stops operation when the bias is within this range. Setting this parameter correctly is helpful to improve the system output accuracy and stability.

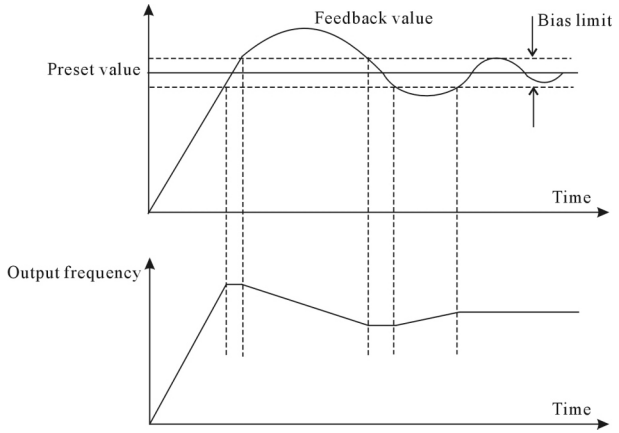


Figure 5-26 Relationship between bias limit and output frequency

Function code	Name	Setting range
F8.09	Feedback lost detecting value	0.0~100.0%【0.0%】
F8.10	Feedback lost detecting time	0.0~3600.0s【1.0s】

When feedback value is less than F8.09 continuously for the period determined by F8.10, the inverter will alarm feedback lost failure (PIDE).

Group F9 Simple PLC and multi-step speed control

Simple PLC function can enable the inverter change its output frequency and directions automatically according to preset running time. For multi-step speed function, the output frequency can be changed only by multi-step terminals

Note

- Simple PLC has 16 steps which can be selected.
- If F1.01 is set to be 5, 16 steps are available for multi-step speed. Otherwise only 15 steps are available (step 1~15).

Function code	Name	Setting range
F9.00	Simple PLC operation mode	0~2【0】

0: Stop after one cycle: Inverter stops automatically as soon as it completes one cycle, and it is needed to given run command to start again.

1: Hold last frequency after one cycle: Inverter holds frequency and direction of last step after one cycle.

2: Circular run: Inverter continues to run cycle by cycle until receive a stop command.

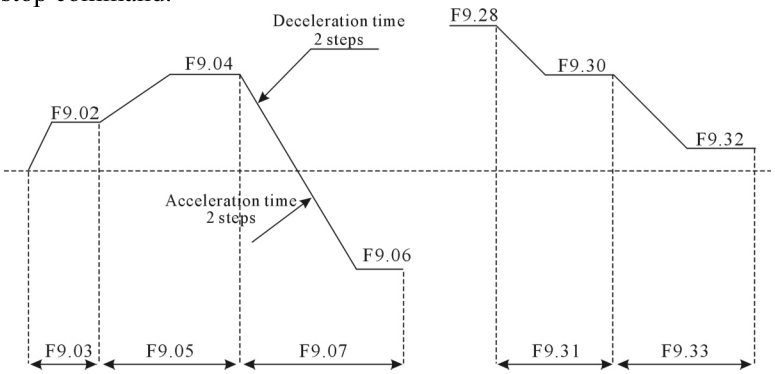


Figure 5-27 Simple PLC operation diagram

Function code	Name	Setting range
F9.01	Simple PLC memory selection	0~1【0】

0: Power-off no memory

1: Power-off memory

This parameter determined whether the running step and output frequency should be saved when power off or not.

Function code	Name	Setting range
F9.02	Multi-step speed 0	-100.0~100.0%【0.0%】
F9.03	0^{th} running time	0.0~6553.5s【0.0s】
F9.04	Multi-step speed 1	-100.0~100.0%【0.0%】
F9.05	1^{st} running time	0.0~6553.5s【0.0s】
F9.06	Multi-step speed 2	-100.0~100.0%【0.0%】
F9.07	2^{nd} running time	0.0~6553.5s【0.0s】
F9.08	Multi-step speed 3	-100.0~100.0%【0.0%】

Function code	Name	Setting range
F9.09	3^{rd} running time	0.0~6553.5s【0.0s】
F9.10	Multi-step speed 4	-100.0~100.0%【0.0%】
F9.11	4^{th} running time	0.0~6553.5s【0.0s】
F9.12	Multi-step speed 5	-100.0~100.0%【0.0%】
F9.13	5^{th} running time	0.0~6553.5s【0.0s】
F9.14	Multi-step speed 6	-100.0~100.0%【0.0%】
F9.15	6^{th} running time	0.0~6553.5s【0.0s】
F9.16	Multi-step speed 7	-100.0~100.0%【0.0%】
F9.17	7^{th} running time	0.0~6553.5s【0.0s】
F9.18	Multi-step speed 8	-100.0~100.0%【0.0%】
F9.19	8^{th} running time	0.0~6553.5s【0.0s】
F9.20	Multi-step speed 9	-100.0~100.0%【0.0%】
F9.21	9^{th} running time	0.0~6553.5s【0.0s】
F9.22	Multi-step speed 10	-100.0~100.0%【0.0%】
F9.23	10^{th} running time	0.0~6553.5s【0.0s】
F9.24	Multi-step speed 11	-100.0~100.0%【0.0%】
F9.25	11^{th} running time	0.0~6553.5s【0.0s】
F9.26	Multi-step speed 12	-100.0~100.0%【0.0%】
F9.27	12^{th} running time	0.0~6553.5s【0.0s】
F9.28	Multi-step speed 13	-100.0~100.0%【0.0%】
F9.29	13^{th} running time	0.0~6553.5s【0.0s】
F9.30	Multi-step speed 14	-100.0~100.0%【0.0%】
F9.31	14^{th} running time	0.0~6553.5s【0.0s】
F9.32	Multi-step speed 15	-100.0~100.0%【0.0%】
F9.33	15^{th} running time	0.0~6553.5s【0.0s】

Note

- 100% of multi-step speed X corresponds to highest frequency (F0.01).
- When at PLC operation mode, user need set F9.02~F9.33 to confirm characteristics.
- Running direction of simple PLC is determined by F9.37

Selection of step is determined by combination of multi-step terminals. Please refer to following figure and table.

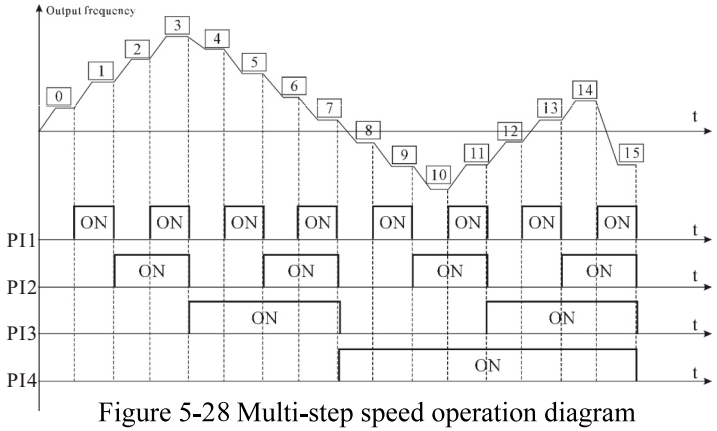


Figure 5-28 Multi-step speed operation diagram

Multi-step speeds are in the range of –F max ~ F max and can be set continuously. The inverter can set 16-step speed, which are selected by code combination of external terminal PI1, PI2, PI3, PI4Combination, corresponds multi-step speed 0 to multi-step speed 15. For details, please refer to description of Figure 6-25.

When PI1,PI2,PI3 and PI4 are all OFF, frequency input mode is selected by F1.01. When PI1,PI2,PI3,PI4 are not all OFF, run at multi-step speed. Priority of multi-step speed is higher than keypad, analog, high speed pulse, PLC, communication frequency input. Select 16 steps speed at most through code combination of PI1, PI2, PI3 and PI4.

When multi-step speed running, Start and stop are determined by F0.00. For control process, please refer to Figure 5-28. Relationship between PI1, PI2, PI3, PI4 terminal and multi-step speed is as shown in following table. (- means terminal disconnects with COM, 1 means terminal closes with COM)

Running section	0	1	2	3	4	5	6	7
PI1	-	1	-	1	-	1	-	1
PI2	-	-	1	1	-	-	1	1
PI3	-	-	-	-	1	1	1	1
PI4	-	-	-	-	-	-	-	-

Running section	8	9	10	11	12	13	14	15
PI1	-	1	-	1	-	1	-	1
PI2	-	-	1	1	-	-	1	1
PI3	-	-	-	-	1	1	1	1
PI4	1	1	1	1	1	1	1	1

Function code	Name	Setting range
F9.34	Simple PLC 1st ~7th acc/dec time selection	0~0xFFFF【0】
F9.35	Simple PLC 8th~15th acc/dec time selection	0~0xFFFF【0】

Detailed instruction is as shown in below table :

Function code	Binary bit		No.	Acc/dec time 0	Acc/dec time 1	Acc/dec time 2	Acc/dec time 3
F9.34	BIT1	BIT0	0	00	01	10	11
	BIT3	BIT2	1	00	01	10	11
	BIT5	BIT4	2	00	01	10	11
	BIT7	BIT6	3	00	01	10	11
	BIT9	BIT8	4	00	01	10	11
	BIT11	BIT10	5	00	01	10	11
	BIT3	BIT12	6	00	01	10	11
	BIT15	BIT14	7	00	01	10	11
F9.35	BIT1	BIT0	8	00	01	10	11
	BIT3	BIT2	9	00	01	10	11
	BIT5	BIT4	10	00	01	10	11
	BIT7	BIT6	11	00	01	10	11
	BIT9	BIT8	12	00	01	10	11
	BIT11	BIT10	13	00	01	10	11
	BIT3	BIT12	14	00	01	10	11
	BIT15	BIT14	15	00	01	10	11

After the user select corresponding acc/dec time, convert the combination of 16-bit binary number into decimal, set corresponding function code.

Function code	Name	Setting range
F9.36	PLC re-start mode selection	0~1【0】

0: Restart from step 0: If the inverter stops during running (due to stop command or fault), it will run from step 0 when it restarts.

1: Continue from paused step: If the inverter stops during running (due to stop command or fault), it will record the running time of current step. When inverter restarts, it will resume from paused time automatically. For details, please refer to following figure.

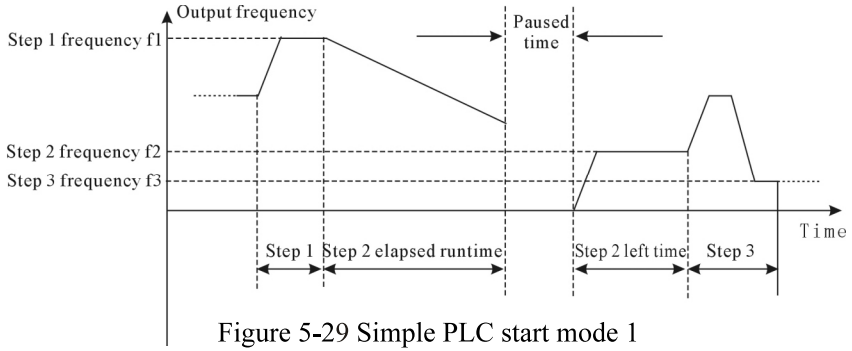


Figure 5-29 Simple PLC start mode 1

Function code	Name	Setting range
F9.37	Time unit	0~1【0】

0: Second

1: Minute

Group FA Keypad and display

Function code	Name	Setting range
FA.00	Reserved	
FA.01	Reserved	
FA.02	Reserved	
FA.03	QUICK/JOG function selection	0~5【0】

QUICK/JOG is a multi-functional key, whose function can be defined by the value of FA.03.

0: Jog: Press QUICK/JOG, the inverter will jog.

1: FWD/REV switching: Press QUICK/JOG, the running direction of inverter will reverse. It is only valid if FA.03 is set to be 0.

2: Clear settings of UP/DOWN: Press QUICK/JOG, the UP/DOWN setting will be cleared.

3~5: Quick debugging mode 1,2,3: Please refer to description of 4.3.2.

Function code	Name	Setting range
FA.04	STOP/RST key stop function selection	0~3【0】

0: Valid when keypad control
1: Valid when keypad or terminal control
2: Valid when keypad or and communication control
3: Always valid

Note

- The value of FA.04 only determines the STOP function of STOP/RST.
- The RESET function STOP/RST is always valid.

Function code	Name	Setting range
FA.05	Reserved	
FA.06	Running status display selection 1	0~0xFFFF【0x07FF】
FA.07	Running status display selection 2	0~0xFFFF【0x0000】

FA.06 and FA.07 define the parameters that can be displayed by LED in running status. If bit is 0, the parameter will not be displayed. If bit is 1, the parameter will be displayed. Press SHIFT to scroll through these parameters.

The display content corresponding to each bit of FA.07 is described in the following table.

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10
PLC multi step speed present no.	Count value	Length value	Output terminal status	Input terminal status	PID feedback value
BIT9	BIT8	BIT7	BIT6	BIT5	BIT4
PID given value	Output torque	Output power	Linear speed	Running speed	Output current

BIT3	BIT2	BIT1	BIT0
Output voltage	Bus voltage	Reference frequency	Output frequency

Input/output terminal status is displayed through decimal. PI1 (HDO) corresponds lowest bit. E.g.: If input status displays 3, it means close of terminal PI1 and PI2. For details, please refer to description of FA.20, FA.21.

Contents of FA.07 low 8-bit are as shown at below:

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
BIT9	BIT8	BIT7	BIT6	BIT5	BIT4
Reserved	Reserved	Reserved	Reserved	Inverter running time	Over load percentage
BIT3	BIT2	BIT1	BIT0		
Motor overload percentage	High-speed pulse HDI	AI2	AI1		

Function code	Name	Setting range
FA.08	Stop status display parameter	0~0xFFFF【0x07FF】

The setting of this function is the same as setting of FA.06. Parameter display is affected by the function code, only when the inverter is at the status of stop.

Display contents under stop status are shown in below table :

BIT15	BIT14	BIT13	BIT12	BIT11	BIT10
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
BIT9	BIT8	BIT7	BIT6	BIT5	BIT4
Multi-step speed present no.	High-speed pulse HDI frequency	Analog quantity AI2 value	Analog quantity AI1 value	PID feedback value	PID given value

BIT3	BIT2	BIT1	BIT0
Output terminal status	Input terminal status	Bus voltage	Reference frequency

Function code	Name	Setting range
FA.09	Speed display coefficient	0.1~999.9%【100.0%】

This parameter is used to calibrate the bias between actual mechanical speed and rotation speed. The formula is as below:

Actual mechanical speed = 120 × output frequency × FA.09/Number of poles of motor.

Function code	Name	Setting range
FA.10	Linear speed display coefficient	0.1~999.9%【1.0%】

This parameter is used to calculate the line speed based on actual mechanical speed. The formula is as below:

Linear speed= Actual mechanical speed×FA.09.

Function code	Name	Setting range
FA.11	Inverter temperature	0~100.0℃
FA.12	Software version	
FA.13	Local accumulation running time	0~65535h

Above parameters are read only.

Inverter temperature: Indicates the temperature of IGBT module.

Software version: Indicates current Software version number.

Accumulating running time: Displays accumulated running time of inverter.

Function code	Name	Setting range
FA.14	Third latest fault type	0~24
FA.15	Second latest fault type	0~24
FA.16	Latest fault Purpose	0~24

These parameters record three recent fault types. For details, please refer to description of Chapter 6.

Function code	Name	Setting range
FA.17	Output frequency at current fault	
FA.18	Output current at current fault	
FA.19	DC Bus voltage at current fault	
FA.20	Input terminal status at current fault	
FA.21	Output terminal status at current fault	

Input terminal status at current fault: This value is displayed as decimal. This value records ON-OFF input terminal status at current fault. The meaning of each bit is as below:

BIT4	BIT3	BIT2	BIT1	BIT0
HDI	PI4	PI3	PI2	PI1

1 indicates corresponding output terminal is ON, while 0 indicates OFF.

This following value records output terminal status at current fault. The meaning of each bit is as below:

BIT3	BIT2	BIT1	BIT0
	OUT	Relay	HDO

1 indicates corresponding output terminal is ON, while 0 indicates OFF. Note: This value is displayed as decimal.

Group Fb Motor parameters

Function code	Name	Setting range
Fb.00	Motor parameter auto-tuning	0~2【0】

0: No action.

1: Rotation parameter auto-tuning.

Before motor parameter auto-tuning, input correctly motor nameplate parameters (Fb.02~Fb.06), disconnect the motor with the load, and make the motor in static status without load. Otherwise, motor parameter auto-tuning could not be right.

Before motor parameter auto-tuning, set acc/dec time (F0.04, F0.05) according to motor inertia. Otherwise, over-current or over-voltage faults will happen during the process of motor parameter auto-tuning.

Set Fb.00 to 1, then press SET, start motor parameter auto-tuning. LED displays “-TUN-” and flashes at the same time. Press RUN to start motor parameter auto-tuning. LED displays “TUN-0” at this time. After display “TUN-1”, the motor starts to run, “RUN/TUNE” flashes. After finishing parameter auto-tuning, displays “-END-”, back to stop status interface finally. When “-TUN-” flashes, press FNC then quit the status of parameter auto-tuning.

During the process of parameter auto-tuning, press STOP/RST to stop operation of parameter auto-tuning.

Note START and STOP of parameter auto-tuning can only be controlled by Keypad. After complete parameter auto-tuning, the function code will restore to 0.

2: Static parameter auto-tuning

When motor static parameter auto-tuning, don’t need disconnect the motor with the load. Before motor parameter auto-tuning, input correct motor nameplate parameters (FB.02~Fb.06). After parameter auto-tuning, detect stator resistance, rotor resistance and leakage inductance of motor.

Function code	Name	Setting range
Fb.01	Rated motor power	0.4~400.0kW【Depend on model】
Fb.02	Rated motor frequency	0.01~F0.01【50.00Hz】
Fb.03	Rated motor speed	0~36000【1460rpm】
Fb.04	Rated motor voltage	0~460V【Depend on model】
Fb.05	Rated motor current	0.8~800.0A【Depend on model】

Note

- In order to achieve superior performance, please set these parameters according to motor nameplate, then perform auto-tuning.
- The power rating of inverter should match the motor. If the bias is too big, the control performances of inverter will be deteriorated distinctly.
- Reset Fb.01 can initialize Fb.06~Fb.10 automatically.

Function code	Name	Setting range
Fb.06	Motor stator resistance	0.001~65.535Ω【Depend on model】
Fb.07	Motor rotor resistance	0.001~65.535Ω【Depend on model】
Fb.08	Inductance of stator / rotor	0.1~6553.5mH【Depend on model】
Fb.09	Mutual inductance of motor stator and rotator	0.1~6553.5mH【Depend on model】
Fb.10	Motor no-load current	0.01~655.35A【Depend on model】

After auto-tuning, the value of Fb.06~Fb.10 will be automatically updated.

Note

Do not change these parameters, otherwise it may deteriorate the control performance of inverter.

Group FC Serial communication

Function code	Name	Setting range
FC.00	Local communication address	0~254【1】

This parameter determines the slave address used for communication with the master. The value "0" is the broadcast address. Please note that the slave address is not set to 0.

Local communication address is unique in communication network. This is infrastructure that achieve upper PC P2P communication with the inverter.

Function code	Name	Setting range
FC.01	Communication baud rate selection	0~5【3】

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

This parameter can set the data transmission rate during serial communication.

Note: The baud rate of the master and the slave must be the same.

Function code	Name	Setting range
FC.02	Data format	0~17【1】

0:No parity check(N, 8, 1) for RTU
1:Even parity check (E, 8, 1) for RTU
2:Odd parity check (O, 8, 1) for RTU
3:No parity check (N, 8, 2) for RTU
4:Even parity check (E, 8, 2) for RTU
5:Odd parity check (O, 8, 2) for RTU
6:No parity check (N, 7, 1) for ASCII
7:Even parity check (E, 7, 1) for ASCII
8:Odd parity check (O, 7, 1) for ASCII
9:No parity check (N, 7, 2) for ASCII
10:Even parity check (E, 7, 2) for ASCII
11:Odd parity check (O, 7, 2) for ASCII
12:No parity check (N, 8, 1) for ASCII
13:Even parity check (E, 8, 1) for ASCII
14:Odd parity check (O, 8, 1) for ASCII

15:No parity check (N, 8, 2) for ASCII
16:Even parity check (E, 8, 2) for ASCII
17:Odd parity check (O, 8, 2) for ASCII

Data format between upper PC and the inverter setting must be the same. Otherwise they can communicate.

Function code	Name	Setting range
FC.03	Communication response delay time	0~200ms【5ms】

This parameter can be used to set the response delay in communication in order to adapt to the MODBUS mater. In RTU mode, the actual communication delay should be no less than 3.5 characters' interval; in ASCII mode, 1ms.

Function code	Name	Setting range
FC.04	Communication timeout failure time	0.0~200.0s【0.0s】

When the function code is set to 0.0s, this function will be disabled. When communication interruption is longer than the non-zero value of PC.04, the inverter will alarm communication error (CE).

Function code	Name	Setting range
FC.05	Communication error processing action selection	0~3【1】

0: Alarm and coast to stop
1: No alarm and continue running
2: No alarm and stop by stop mode (only communication control mode)
3: No alarm and stop by stop mode (all control mode)

Select to screen CE failure, stop or keep running through setting communication error process action when communication is abnormal.

Function code	Name	Setting range
FC.06	Communication processing action selection	0~1【0】

When LED units digit of the function code is set to 0, the inverter response to upper PC's read/write command.

When LED units digit of the function code is set to 1, the inverter only response to upper PC's read command, no response to write command. It can improve communication efficiency through this method.

Group Fd Model selection

Function code	Name	Setting range
Fd.00	Model selection	0~1【0】

0: Suitable for general purpose loads;
1: Suitable for fan and pump purpose loads

SY6000 series inverter adopts one form of G/P types. Applicable motor power rating of G type inverter is smaller one grade than P type inverter. For example, inverter of model no.:SY6000-G2D240/P3D740, factory setting is 2.2kW G type. Set the function code to 3.7kW P type.

Factory setting of the inverter is parameter of G type. If user select P type inverter, please set the function code to 1 and reset Group Fb.

Group FE Factory parameter

This group is the factory parameter. It is prohibited for user to access.

Chapter 6 Troubleshooting

6.1 Fault and troubleshooting

Fault code	Name	Reason	Troubleshooting
FLt	IGBT fault	1.Acc/dec time is too short 2. IGBT module fault 3.Malfunction caused by interference. 4.Grounding is not properly.	1. Increase acc/dec time 2.Ask for technical support. 3.Inspect external equipment and eliminate interference
OC1	Over current when acc running	1.Acc time setting is too short 2.Grid voltage is a little low 3. Model selection of the inverter is small	1. Increase acc time 2. Check input power supply 3.Select bigger power rating the inverter.
OC2	Over current when dec running	1.Dec time setting is too short 2.Load inertia torque is big 3.Model selection of the inverter is small	1.Increase dec time 2.Add energy braking unit 3.Select bigger power rating inverter
OC3	Over current when constant speed running	1.Load changes suddenly or abnormally 2.Grid voltage is too low 3. Model selection of the inverter is small	1.Check the load or reduce the load 2. Check input power supply 3.Select bigger the inverter
OE1	Over voltage in acc running	1.Input voltage anomaly 2.After instant power-off, restart the motor in rotation	1. Check input power supply 2.Avoid stop and restart
OE2	Over voltage in dec running	1.Dec too fast 2.Load inertia is too big 3.Input voltage anomaly	1.Increase dec time 2.Increase energy braking unit 3. Check input power supply

Fault code	Name	Reason	Troubleshooting
OE3	Over voltage in constant speed running	1.Input voltage is abnormal; 2.Load is under electricity generating	1.Install input reactor 2.Add energy braking unit
Uv	Bus under voltage	1. Grid voltage is too low	1.Check power grid input power supply
OL1	Motor over load	1.Grid voltage is too low 2.Setting of rated motor current is not correct 3.The motor stalls or sudden change of the load 4.Small power the inverter drives heavy load motor	1.Check power grid voltage 2.Reset rated motor current 3.Check load, adjust torque hoist value 4.Choose suitable power motor
OL2	the inverter over load	1.Acc too fast 2.Restart the motor under rotating 3.Grid voltage is too low 4.Load is too big	1.Increase acc time 2.Avoid stop and restart 3.Check power grid voltage 4. Re-select appropriate power the inverter
SPO	Output phase failure	1.U, V, W phase failure output 2.IGBT fault	1.Check output wire 2.Check motor and wire 3.Ask for technical support
Ot	Over heat	1.Frequency inverter runs under over load in long run 2.Air duct blocks or fan failure 3.Ambient temperature is beyond allowable value 4.Wire or plug of control board loose 5.Auxiliary power supply failure, driving voltage is under voltage 6. Control board is abnormal.	1. Re-select suitable power rating the inverter 2. Open up air duct or replace cooling fan 3.Reduce ambient temperature 4.Check and re-connect 5.Ask for technical support 6.Ask for technical support
EF	External fault	PI external fault input terminal action	Inspect external equipment input

Fault code	Name	Reason	Troubleshooting
CE	Communication fault	1.Improper baud rate setting 2.Receive wrong data 3.Commnunication is interrupted for long time	1. Set proper baud rate 2. Press STOP/RST key to reset, ask for technical support 3. Check wiring of communication interface
ItE	Current detection fault	1.Wires or connectors of control board are loose 2.Auxiliary power supply is damaged 3.Hall sensor is damaged 4.Amplifying circuit is abnormal	1.Checkthe wiring 2.Ask for technical support 3.Ask for technical support 4.Ask for technical support
tE	Motor auto-tuning fault	1. Improper setting of motor rated parameters 2. Auto-tuning is over time	1. Set rated parameters according to motor nameplate 4. Check motor's wiring
Err	EEPROM fault	1.Read/write of control parameter is wrong 2.EEPROM damaged	1. Press STOP/RST key to reset 2. Ask for technical support
PIDE	PID feedback fault	1. PID feedback disconnected 2. PID feedback source disappears	1. Inspect PID feedback signal wire 2. Inspect PID feedback source
bCE	Braking unit fault	1. Braking circuit failure or brake tube damaged 2. Too low resistance of externally connected braking resistor	1. Inspect braking unit, replace braking tube 2. Increase braking resistance

6.2 Anomaly and countermeasure

Frequency inverter may have following faults or malfunctions during operation, please refer to following solutions.

Fault type	Reason	Troubleshooting
No display after power on	1.Input power supply is abnormal; 2.Connectors are loose; 3.Switch power supply is damaged; 4.Keypad is damaged.	1.Inspect whether the voltage of input power supply meets the demand; 2.Inspect whether wires between keypad and control board contact well; 3.Ask for technical support; 4.Ask for technical support.
Power supply air switch trips off when power on	1.Input short circuit; 2.Circuit breaker is improper; 3.ELCB is improper.	1.Inspect whether input circuit is normal; 2.Select proper circuit breaker; 3.Select proper ELCB.
Motor doesn't move after inverter running	1.Choose wrong model no. of the inverter; 2.Set wrong parameters of the inverter; 3.External control signal is abnormal; 4.Output cable of the inverter is abnormal; 5.No output of the inverter	1.Re-select the inverter with proper power rating; 2.Reset proper parameters; 3.Inspect whether control signal or wire is normal; 4.Inspect whether cables between the inverter output and motor input connect well; 5.Ask for technical support.

Chapter 7 Maintenance

Caution

- Maintainers must be performed according to designated maintenance methods.
- Maintenance, inspection and replacement of parts must be performed only by certified person.
- After turning off the main circuit power supply, wait for 10 minutes before maintenance or inspection.
- Do not directly touch components or device of PCB board. Otherwise inverter can be damaged by electrostatic.
- After maintenance, all screws must be tightened.

7.1 Daily maintenance

In order to reduce faults of the inverter, ensure equipments working stably and prolong using life of the inverter, we must do regular inspection maintenance. Daily maintenance contents are as shown in below table:

Inspection item	Content
Temperature / humidity	Confirm ambient temperature between -10℃～40℃, humidity between 20～90%RH, no dew.
Oil mist and dust	Confirm no oil mist and dust in the inverter, no water
Heating / vibration	Check whether abnormal heating or abnormal vibration of the inverter
Cooling fan	Ensure cooling fan work normally, no sundries block.
Input power supply	Ensure voltage and frequency of input power supply are in valid range.
Motor	Check whether abnormal vibration, abnormal noise or open-phase of the motor.
Cooling duct	Ensure ventilation duct is good, not been blocked

7.2 Periodic maintenance

In order to reduce faults of the inverter, ensure equipments working stably in long time, user must inspect the inverter in regular (every half year).

The inspection contents are as shown below:

Inspection items	Inspection contents	Countermeasures
Screws of external terminals	Whether screws loose	Tighten with a screwdriver
PCB board	Dust, or not	Use dry compressed air to clear dust.
Cooling fan	Abnormal noise, abnormal vibration, or accumulation running time is excess using life time	1, Clear dust; 2, Replace cooling fan
Electrolytic capacitor	Discoloring, off-flavor, or accumulation running time is excess using lifetime	Replace electrolytic capacitor
Radiator	Dust or not	Use dry compressed air to clear dust.
Power components	Dust or not	Use dry compressed air to clear dust.

7.3 Replacement of wearing parts

Cooling fan and electrolytic capacitor are vulnerable parts of the inverter. In order to ensure long-time, safe and out-of-fault running of the inverter, vulnerable parts must be replaced in regular. The replacement time under normal working condition is below:

◆Cooling fan: Must replace after using 20,000 hours.

◆Electrolytic capacitor: Must replace after using 30,000~40,000 hours.

7.4 Guarantee

The vendor will provide 18months guarantee after delivery out of factory.

Chapter 8 Communication protocol

The inverter provides RS485 communication interface, adopts international standard Modbus communication protocol to execute master-slave communication. In order to meet specific application requirements, user can control upper PC to achieve centralized control through PC/PLC (set inverter control command and running frequency, modify parameters of function code, monitor working status and fault information and so on).

8.1 Protocol content

The Modbus serial communication protocol defines frame content and using format of the asynchronous serial communication transmission. These include host polling and broadcast frames, the salve response frame format; Frame content of the master machine includes the slave address (or broadcast address), executive command, data and error checking.

The slave response also adopts the same structure. The content includes action confirmation, return data and error checking. If error happens when the slave receives frames or the slave can't complete the action which the master requests, it will make a fault frame as a response feedback to the master.

8.2 Application mode

The inverter can access "single master multi slave" control network with RS485 bus.

8.3 Bus structure

(1) Interface mode

RS485 hardware interface

(2)Transmission mode

Asynchronous serial, half-duplex transmission mode. Only one can send data and another one receive data between master machine and slave machine at the same time. Data is sent frame by frame in the form of packets during the process of serial asynchronous data communication.

(3)Topological structure

Single master multi slave system. Setting range of slave machine address is 1～254, 0 is broadcasting communication address. Every address of slave machine is unique. This ensures the foundation of ModBus serial communication.

8.4 Protocol instruction

The communication protocol of SY6000 series frequency inverter is asynchronous serial master slave Modbus communication protocol. Only one device can build protocol(call as “enquiry/command”). Other device (the slave machine) response “enquiry/command” of the master through providing data, or make corresponding action according to “enquiry/command” of the master.

The master machine means PC, industry control device or PLC. The slave machine means SY6000 series frequency inverter or other control devices with same communication protocol. The master not only communicate independently with the slave, but also release broadcasting information. As per independent access “enquiry/command” of the master, the slave must response a message (call as response). As per broadcasting message of the master, the slave doesn’t need response to the master.

8.5 Communication frame structure

Data format of ModBus protocol communication is divided into RTU (Remote Terminal Unit) mode and ASCII (American Standard Code for Information International Interchange) mode.

In RTU mode, format of each byte is as following:

Coding system: 8-bit binary, each 8-bit frame contains two hexadecimal system characters, Hexadecimal system 0～9, A～F.

ASCII mode, the format of each byte is as following:

Coding system: Communication protocol is 16 hex, info character meaning of ASCII: “0”…“9”, “A”…“F” each 16 hex is shown with corresponding ASCII character information.

Character	‘0’	‘1’	‘2’	‘3’	‘4’	‘5’
ASCII code	0x30	0x31	0x32	0x33	0x34	0x35
Character	‘6’	‘7’	‘8’	‘9’	‘A’	‘B’
ASCII code	0x36	0x37	0x38	0x39	0x41	0x42
Character	‘C’	‘D’	‘E’	‘F’		
ASCII code	0x43	0x44	0x45	0x46		

Data format: start bit, 7/8 data bit, check bit and stop bit.

Description of data format is as following:

11-bit character frame:

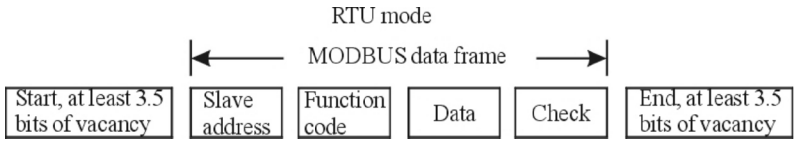
	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	BIT 8	check bit	stop bit

10-bit character frame:

Start	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	BIT 7	check bit	stop bit

In RTU mode, the new frame is always at least 3.5 bytes transmission time as a start. On the network which is calculated transmission rate by baud rate, 3.5 bytes transmission time can easily grasp. Data fields of transmission are followed: slave address, operation command code, data and CRC checksum. Each field transmission byte is hexadecimal byte 0...9, A...F.

Network devices always monitors activities of communication bus. When receiving the first field (address information), each network device confirm to the byte. With finishing of the last byte of transmission, a similar 3.5 bytes transmission time interval is used to identify the end of the frame. After this, a new frame transmission starts.



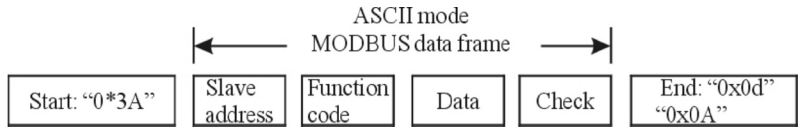
A frame information must be transferred as a continuous data stream. If the entire frame has more than 1.5 bytes internal time before transmission finishes, the receiving device will clear these incomplete information, and wrongly consider the follow byte is the address or part of new frame.

Similarly, if the internal time between the start f a new frame and the previous frame is less than 3.5 bytes, the receiving device will consider it a continuation of the previous frame. Because of frame disorder, finally CRC checksum is incorrect, then results in communication error.

Standard structure of RTU frame:

START	T1-T2-T3-T4 (transmission time of 3.5)
ADDR of slave machine address field	Communication address: 0～247 (decimal) (0 is broadcasting address)
Function field command	03H: Read parameters of slave machine; 06H: Write parameters of slave machine
Data field DATA (N-1) … DATA (0)	2*N characters data, this part is main content of communication and the core of data exchange.
CRC CHK low byte	Detection value: CRC check value (16BIT)
CRC CHK high byte	
END	T1-T2-T3-T4 (transmission time of 3.5)

In ASCII mode, the frame head is ": " ("0x3A"), the default of frame end is "CRLF" ("0x0D""0x0A") . In ASCII mode, other data bytes are sent by ASCII code, except the frame head and the frame end. Send the high 4 bytes, and then send the low 4 bytes. In ASCII mode, data are 8-bit length. For 'A'～'F', use ASCII code of capital letters. At this time, use LRC check, range from the slave address to data information part.



Standard structure of ASCII frame:

START	':' (0x3A)
Address Hi	Communication address: 8-bit address composed of 2 ASCII characters
Address Lo	
Function Hi	Function code: 8-bit address composed by 2 ASCII characters
Function Lo	
DATA (N-1) … DATA (0)	Data content: nx8-bit data content composed by 2n ASCII characters n≤16, 32 ASCII character max.
LRC CHK Hi	LRC check code: 8-bit check character composed by 2 ASCII characters
LRC CHK Lo	
END Hi	End character: END Hi=CR (0x0D) , END Lo=LF (0x0A)
END Lo	

8.6 Description of command code and communication data

8.6.1 Command code: 03H (0000 0011)

Read N words (max to 16 words)

E.g.: When the slave address is 01H, memory initial address is 0004, read 2 words continuously, while structure description of the frame is as following:

RTU request command:

START	T1-T2-T3-T4
ADDR	01H
Command	03H
High byte of start address	00H
Low byte of start address	04H
High byte of data number	00H
Low byte of data number	02H
CRC CHK low byte	85H
CRC CHK high byte	CAH
END	T1-T2-T3-T4

RTU reply command:

START	T1-T2-T3-T4
ADDR	01H
Command	03H
byte number	04H
High byte of data address 0004H	13H
Low byte of data address 0004H	88H
High byte of data address 0005H	13H
Low byte of data address 0005H	88H
CRC CHK low byte	73H
CRC CHK high byte	CBH
END	T1-T2-T3-T4

ASCII request command:

START	':'
ADDR	'0'
	'1'
Command	'0'
	'3'
High byte of start address	'0'
	'0'
Low byte of start address	'0'
	'4'
High byte of data number	'0'
	'0'
Low byte of data number	'0'
	'2'
LRC CHK Hi	'F'
LRC CHK Lo	'6'
END Hi	CR
END Lo	LF

ASCII reply command:

START	':'
ADDR	'0'
	'1'
Command	'0'
	'3'
Byte number	'0'

	'4'
High byte of data address 0004H	'1'
	'3'
Low byte of data address 0004H	'8'
	'8'
High byte of data address 0005H	'1'
	'3'
Low byte of data address 0005H	'8'
	'8'
LRC CHK Hi	'C'
LRC CHK Lo	'2'
END Hi	CR
END Lo	LF

8.6.2 Command code: 06H (0000 0110)

Write 1 word (Word)

E.g.: Write 5000 (1388H) into 002BH address of slave address 02H. And structure description of the frame is as following:

RTU request command:

START	T1-T2-T3-T4
ADDR	02H
Command	06H
High byte of write data address	00H
Low byte of write data address	2BH
High byte of data content	13H
Low byte of data content	88H
CRC CHK low byte	F4H
CRC CHK high byte	A7H
END	T1-T2-T3-T4

RTU reply command:

START	T1-T2-T3-T4
ADDR	02H
Command	06H
High byte of write data address	00H
High byte of write data address	2BH
High byte of data content	13H
Low byte of data content	88H
CRC CHK low byte	F4H

CRC CHK high byte	A7H
END	T1-T2-T3-T4

ASCII request command:

START	':'
ADDR	'0'
	'2'
Command	'0'
	'6'
High byte of write data address	'0'
	'0'
High byte of write data address	'2'
	'B'
High byte of data content	'1'
	'3'
Low byte of data content	'8'
	'8'
LRC CHK Hi	'3'
LRC CHK Lo	'2'
END Hi	CR
END Lo	LF

ASCII reply command:

START	':'
ADDR	'0'
	'2'
Command	'0'
	'6'
High byte of write data address	'0'
	'0'
High byte of write data address	'2'
	'B'
High byte of data content	'1'
	'3'
Low byte of data content	'8'
	'8'

LRC CHK Hi	'3'
LRC CHK Lo	'2'
END Hi	CR
END Lo	LF

8.6.3 Command code: 08H (0000 1000)

Diagnostic function

Meaning of subfunction code:

Subfunction code	Explanation
0000	Return to enquiry info data

E.g.: Do loop detection to drive address 01H. String contents of inquiry message and response message are the same. The formats are as follows:

RTU request command:

START	T1-T2-T3-T4
ADDR	01H
Command	08H
Subfunction code high byte	00H
Subfunction code low byte	00H
High byte of data content	12H
Low byte of data content	ABH
CRC CHK low byte	ADH
CRC CHK high byte	14H
END	T1-T2-T3-T4

RTU reply command:

START	T1-T2-T3-T4
ADDR	01H
Command	08H
Subfunction code high byte	00H
Subfunction code low byte	00H
High byte of data content	12H

Low byte of data content	ABH
CRC CHK low byte	ADH
CRC CHK high byte	14H
END	T1-T2-T3-T4

ASCII request command:

START	':'
ADDR	'0'
	'1'
Command	'0'
	'8'
Subfunction code high byte	'0'
	'0'
Subfunction code low byte	'0'
	'0'
High byte of data content	'1'
	'2'
Low byte of data content	'A'
	'B'
LRC CHK Hi	'3'
LRC CHK Lo	'A'
END Hi	CR
END Lo	LF

ASCII reply command:

START	':'
ADDR	'0'
	'1'
Command	'0'
	'8'
Subfunction code high byte	'0'
	'0'
Subfunction code low byte	'0'
	'0'
High byte of data content	'1'
	'2'
Low byte of data content	'A'
	'B'

LRC CHK Hi	'3'
LRC CHK Lo	'A'
END Hi	CR
END Lo	LF

8.6.4 Verification mode of communication frame error

Frame error checking method includes check of two parts: bit check of bytes (odd /even parity check) and data check of the whole frame data (CRC check or LRC check).

8.6.4.1 Byte check

Users can choose different bit check mode, or choose no check. It will effect check bit setting of each byte.

Meaning of even parity check: add an even parity check bit before data transmission, which is used to represent number of "1" in transmission data is odd or even number. If it is even number, set check bit "0", otherwise set "1", in order to maintain the same parity of data.

Meaning of odd parity check: add an odd parity check bit before data transmission, which is used to represent number of "1" in transmission data is odd or even number. If it is odd number, set check bit "0", otherwise set "1", in order to maintain the same parity of data.

E.g.: In the transmission of "11001110", there are five "1". If use even parity check, the even parity check bit is "1". If use odd parity check, the odd parity check bit is "0". When transfer data, calculate odd even parity check bit, put the result at the position of frame check bit, and the receiving device also need do odd even parity check. If you find the parity of receiving data is inconsistent with the preset, communication error occurs.

8.6.4.2 CRC check---CRC (Cyclical Redundancy Check):

In RTU mode, frame includes frame error detection field which is based on CRC calculation. CRC field tests the contents of the frame. CRC field is two bytes, including 16-bit binary value. It is added to the frame after calculated by transmission device. The receiving device recalculates CRC of the receiving frame, with comparison with the value of CRC field. If two CRC value are not equal, then the transmission errors.

Firstly CRC writes in 0xFFFF, then call an procedure, process 6 or more consecutive bytes in the frame with current value of the register. Only 8 bit data of each character is valid to CRC. Start bit, stop bit and odd /even parity check bit are all invalid.

In the process of CRC generating, each 8-bit character is separately XOR with contents in register. The results move to the lowest validity bit, and highest validity bit is filled with 0. LSB is extracted detection. If LSB is 1, Register is separately XOR with preset value. If LSB is 0, no action. The whole process should be repeated 8 times. After the latest bit (the 8th bit) accomplishes, next 8-bit is separately XOR with current value in the register. Finally, the value in register is CRC value that all bytes in the frame accomplish.

CRC calculation method adopts international standard CRC check rule. When editing the CRC algorithm, users can refer to relevant standard CRC algorithm.

For users information, we provide a simple function of CRC calculation (Programming with C language).

```
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);
}
```

In ladder logic, CKSM calculates CRC value according to the frame content by look-up table method. The procedure of this method is simple, with fast operation, but ROM space which the program occupied is large. If the situation requires program space, please use with caution.

8.6.4.3 ASCII mode (LRC Check)

Check code (LRC Check) is the value composed of results from address to data content. Please refer to above 8.6.2 check code of communication information: 0x02+0x06+0x00+0x08+0x13+0x88=0xAB, then take 2's compliment =0x55.

For your information, now we provide LRC calculation and simple function. (Programming with C language) :

```
Static unsigned char
LRC(auchMsg,usDataLen)
unsigned char *auchMsg;
unsigned short usDataLen;
    {
    unsigned char uchLRC=0;
    while(usDataLen--)
    uchLRC+=*auchMsg++;
    return((unsigned char)(～((char)uchLRC)));
    }
```

8.6.5 Definition of communication data address

This part is the definition of communication data address，it used to control the frequency inverter operation，get the status information and relevant function parameters settings of frequency inverter, etc.

(1) The parameters address of function code are listed in the following table.

Take function code as parameters corresponding to register address, but want to convert to Hexadecimal system，for example, the number of

F2.05 is27， take the Hexadecimal system Table to show the address of the function code is 001BH.

The range of high byte and low byte is like this: high byte——00～01; low byte——00～FF.

Note: PE group: For setting parameters for the factory, not only parameter of this group can not be read, but also parameters can not be changed. When frequency inverter is running, some parameters can not be changed. Regardless of what status of frequency inverter, some parameters can not be changed. When changes parameters of function code, please pay attention to setting range of parameters, units and related instructions.

In addition, the using life of EEPROM will be reduced if EEPROM is stored frequently. For users, some function codes don't need store in communication mode, just change the value in the RAM chip to meet the requirements. To achieve this function, just need change highest byte of corresponding function code address from 0 into 1.

E.g.: If don't store Function code P0.07 in EEPROM and just change the value in RAM, you can set the address to 8007. This address can only be used to write on-chip RAM and can not be used as a read function. The address is invalid if use as read.

(2) Address description of other functions:

Parameter description	Address	Meaning of value	R/W feature
Control command	1000H	0001H: Forward	W/R
		0002H: Reverse	
		0003H: Jog forward	
		0004H: Jog reverse	
		0005H: Stop	
		0006H: Coast to stop	
		0007H: Reset fault	
		0008H: Jog stop	

Parameter description	Address	Meaning of value	R/W feature
Inverter status	1001H	0001H: Forward running	R
		0002H: Reverse running	
		0003H: Standby	
		0004H: Fault	
Communication setting	2000H	Communication setting range (-10000～10000) Note: Communication setting is percentage of relative value (-100.00%～100.00%) . Communication write operation is valid. The relative is percentage of maximum frequency F0.01 when set as frequency source; The relative is percentage of PID when set as PID given or feedback.	W/R
Virtual terminal input function setting	2001H	Reserved	W/R
Status parameters	3000H	Running frequency	R
	3001H	Reference frequency	R
	3002H	Bus voltage	R
	3003H	Output voltage	R
	3004H	Output current	R
	3005H	Running speed	R
	3006H	Output power	R
	3007H	Output torque	R
	3008H	PID preset value	R
	3009H	PID feedback value	R
	300AH	Terminal input status	R
	300BH	Terminal output status	R

Parameter description	Address	Meaning of value	R/W feature
	300CH	Input of AI1	R
	300DH	Input of AI2	R
	300EH	Reserved	R
	300FH	Reserved	R
	3010H	HDI1 frequency	R
	3011H	Reserved	R
	3012H	Multi-step speed and PLC present no.	R
	3013H	Length value	R
	3014H	External counter input	R
	3015H	Torque direction (0: Forward, 1: Reverse)	R
	3016H	Device code	R
Check address of parameter lock password	4000H	****	W
Command address of parameter lock password	4001H	55AAH	W
Inverter fault address	5000H	Fault info code is accordance with number of fault type in function code menu. This returns to upper PC is data of hexadecimal system , not fault character.	R

Note Table of data read from 5000H and actual faults:

Data	Fault type
0x00	No failure
0x01	IGBT fault (FLt)
0x02	Reserved

Data	Fault type
0x03	Reserved
0x04	Acc over-current (OC1)
0x05	Dec over-current (OC2)
0x06	Constant speed over-current (OC3)
0x07	Over voltage in acc running (OE1)
0x08	Over voltage in decal running (OE2)
0x09	Over voltage in constant speed running (OE3)
0x0A	Bus under-voltage failure (Uv)
0x0B	Motor overload (OL1)
0x0C	Over load (OL2)
0x0D	Reserved
0x0E	Output phase failure (SPO)
0x0F	Over heat (Ot)
0x10	Reserved
0x 11	External fault (EF)
0x 12	Communication error (CE)
0x 13	Current detection error (ItE)
0x 14	Motor self-learning error (tE)
0x 15	EEPROM operation error (Err)
0x 16	PID feedback disconnection error (PIDE)
0x 17	Braking unit failure (bCE)

The parameter which read from frequency inverter is denoted in hex 16, and the value is: actual value*10^K. K is digit after decimal point of the parameter.

8.6.6 Response to error messages

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

Meaning of error codes (Modbus odd codes)		
Code	Name	Meaning
01H	Illegal command	The command from master can not be executed. The reason maybe: 1) This command is only for new version and this version can not realized. 2) Slave is in fault status and can not execute it.
02H	Illegal data address	Some of the operation addresses are invalid or not allowed to access.
03H	Illegal value	When there are invalid data in the message frame received by slave. Note: This error code does not indicate the data value to write exceed the range, but indicate the message frame is a illegal frame.
06H	Slave busy	The inverter is busy (EPPROM is storing)
10H	Password error	Password written by password check address and password set by user are different.
11H	Check error	The CRC (RTU mode) or LRC (ASCII) check not passed.
12H	Written not allowed	It only happen in write command, the reason maybe: 1) the data to write exceed the range of according parameter; 2) the parameter should not be modified now; 3) the terminal has already been used.
13H	System locked.	When password protection take effect and user does not unlock it, write/read the function parameter will return this error.

8.6.7 Encoding rule of device codes

Codes are composed of 16 digits; divided into high 8-bit and low 8-bit. High 8-bit shows models, low 8-bit shows machine variants.

Meaning of device codes			
Code High 8-bit	**Meaning**	**Code Low 8-bit**	**Meaning**
02	SY6000	01	General purpose frequency inverter

Chapter 9 Parameter table

Parameters of SY6000 series inverter are divided into groups. FE group is factory reserved, users are forbidden to access these parameters.

The column "Modify" determines the parameter can be modified or not.

"○": indicates that this parameter can be modified all the time.

"◎": indicates that this parameter cannot be modified during the inverter is running.

"●": indicates that this parameter is read only.

"Factory setting" indicates the value of each parameter will restoring the factory parameters, but those detected parameters or record values cannot be restored.

Function code	**Name**	**Parameter details**	**Reserved**	**Mod**	**No.**
Group F0 Basic function					
F0.00	Running setting selection	0: Keypad running 1: Terminal running 2: Communication running	0	◎	0
F0.01	Maximum output frequency	F0.02~600.00Hz	50.00Hz	◎	1
F0.02	Running frequency upper limit	F0.03~F0.01	50.00Hz	◎	2
F0.03	Running frequency lower limit	0.00 Hz~F0.02	0.00Hz	◎	3
F0.04	Acc time 0	0.1~3600.0s	Depend on model	○	4
F0.05	Dec time 0	0.1~3600.0s	Depend on model	○	5
F0.06	Rated power of the inverter	1.5~400.0kW	Depend on model	●	6
F0.07	Rated current of the inverter	0.0~800.0A	Depend on model	●	7
F0.08	Restore parameters	0: No action 1: Restore factory setting 2: Clear fault records	0	◎	8
Group F1 Frequency setting					
F1.00	Keypad reference	0.00 Hz~F0.01	50.00Hz	○	9

Function code	Name	Parameter details	Reserved	Mod	No.
	frequency				
F1.01	Main frequency command	0: Keypad 1: AI1 2: AI2 3: HDI 4: Simple PLC 5: Multi-step speed 6: PID 7: Communication 8: Potentiometer	0	○	10
F1.02	Auxiliary frequency command	0: AI1 1: AI2 2: HDI	0	○	11
F1.03	Auxiliary frequency reference	0: Highest output frequency 1: Main frequency command	0	○	12
F1.04	Frequency command selection	0: Main 1: Auxiliary 2: Main + auxiliary 3: Max (Main, auxiliary)	0	○	13
F1.05	UP/DOWN setting	0: Valid, save UP/DOWN value when power off 1: Valid, do not save UP/DOWN value when power off 2: Invalid	0	○	14
F1.06	Jog output frequency	0.00~F1.01	5.00Hz	○	15
F1.07	Jog running acc time	0.1~3600.0s	Depend on model	○	16
F1.08	Jog running dec time	0.1~3600.0s	Depend on model	○	17
F1.09	Jump frequency 1 upper limit	F1.10~F0.01	0.00Hz	○	18
F1.10	Jump frequency 1 lower limit	0.00~F1.09	0.00Hz	○	19
F1.11	Jump frequency 2	F1.12~F0.01	0.00Hz	○	20

Function code	Name	Parameter details	Reserved	Mod	No.
	upper limit				
F1.12	Jump frequency 2 lower limit	0.00~F1.11	0.00Hz	○	21
Group F2 Start-stop control					
F2.00	Start running mode	0: Direct start 1: DC braking, then restart	0	◎	22
F2.01	Direct-start start frequency	0.00~10.00Hz	0.00Hz	◎	23
F2.02	Start frequency hold time	0.0~50.0s	0.0s	◎	24
F2.03	Braking current before start	0.0~150.0%	0.0%	◎	25
F2.04	Braking time before start	0.0~50.0s	0.0s	◎	26
F2.05	Acc/dec mode selection	0: Linear type 1: Reserved	0	◎	27
F2.06	Stop mode	0: Dec stop 1: Coast to stop	0	○	28
F2.07	Stop braking start frequency	0.00~50.00Hz	0.00Hz	○	29
F2.08	Stop braking waiting time	0.0~50.0s	0.0s	○	30
F2.09	Stop DC braking current	0.0~150.0%	0.0%	○	31
F2.10	Stop DC braking time	0.0~50.0s	0.0s	○	32
F2.11	Forward reverse dead time	0.0~3600.0s	0.0s	○	33
F2.12	Lower limit frequency mode (valid when frequency lower limit >0)	0: Run at frequency lower limit 1: Stop 2: Sleep standby	0	◎	34
F2.13	Power-off restart	0: Restart disabled	0	○	35

Function code	Name	Parameter details	Reserved	Mod	No.
	(7.5kW or above)	1: Restart enabled			
F2.14	Restart waiting time (7.5kW or above)	0.0~3600.0s (Enable when F2.13=1)	0.0s	○	36
F2.15	Power-on terminal running protection	0: Disabled when power on 1: Enabled when power on	0	○	37
F2.16	Reserved				38
F2.17	Reserved				39
F2.18	Reserved				40
Group F3 Auxiliary running					
F3.00	Running direction	0: Forward 1: Reverse 2: Forbid reverse	0	◎	41
F3.01	PWM mode	0: Fixed 1: Random	0	○	42
F3.02	Carrier frequency adjust based on temperature	0: Disabled 1: Enabled	0	◎	43
F3.03	Automatic voltage regulator function	0: Disabled 1: Enabled all the time 2: Disabled during deceleration	1	○	44
F3.04	Slip compensation limit	0.0~200.0%	0.0%	○	45
F3.05	Auto energy saving running	0: Disabled 1: Enabled	0	◎	46
F3.06	Carrier frequency setting	1.0~10.0kHz	Depend on model	○	47
F3.07	Torque hoist	0.0% (automatically) , 0.1%~10.0%	0.0%	○	48
F3.08	Torque boost cut-off	0.0%~50.0% (rated motor frequency)	20.0%	◎	49

Function code	Name	Parameter details	Reserved	Mod	No.
F3.09	V/F curve	0: Linear curve 1: Multi-point V/F curve 2: 1.3th power torque V/F curve 3: 1.7^{th} power torque V/F curve 4: 2.0^{th} power torque V/F curve	0	◎	50
F3.10	V/F frequency 1	0.00Hz~F3.12	5.00Hz	○	51
F3.11	V/F voltage 1	0.0%~100.0% (rated motor voltage)	10.0%	◎	52
F3.12	V/F frequency 2	F3.10~F3.14	30.00Hz	○	53
F3.13	V/F voltage 2	0.0%~100.0% (rated motor voltage)	60.0%	◎	54
F3.14	V/F frequency t3	F3.12~Fb.02 (rated motor frequency)	50.00Hz	○	55
F3.15	V/F voltage 3	0.0%~100.0% (rated motor voltage)	100.0%	◎	56
F3.16	PWM mode	0: PWM mode 1 1: PWM mode 2	0	○	57
F3.17	Reserved				58
F3.18	Reserved				59
F3.19	Reserved				60
F3.20	Reserved				61
F3.21	Reserved				62
F3.22	Reserved				63
F3.23	Reserved				64
F3.24	Reserved				65
F3.25	Reserved				66
F3.26	Reserved				67
F3.27	Reserved				68

Function code	Name	Parameter details	Reserved	Mod	No.
Group F4 Input terminals					
F4.00	HDI selection	0: High-speed pulse input 1: ON-OFF input	0	◎	69
F4.01	PI1 terminal function selection	0: Invalid 1: Forward 2: Reverse 3: 3-wire control 4: Jog forward 5: Jog reverse 6: Coast to stop 7: Reset fault 8: Pause running 9: External fault input 10: Up command 11: Down command 12: Clear UP/DOWN 13: Switch between Main and Auxiliary 14: Switch between Main and (Main + auxiliary) 15: Switch between Auxiliary and (Main + auxiliary) 16: Multi-step speed Terminal 1 17: Multi-step speed Terminal 2 18: Multi-step speed terminal 3 19: Multi-step speed terminal 4 20: Multi-step speed pause 21: Acc/dec time selection 1 22: Acc/dec time selection 2 23: Reset simple PLC when stop 24: Pause simple PLC 25: Pause PID 26: Pause traverse operation 27: Reset traverse operation 28: Reset counter 29: Reset length 30: Acc/dec ramp hold 31: Counter input 32~39: Reserved	1	◎	70
F4.02	PI2 terminal function selection		4	◎	71
F4.03	PI3 terminal function selection		7	◎	72
F4.04	PI4 terminal function selection		0	◎	73
F4.05	HDI terminal function		0	◎	74
F4.06	ON-OFF filter times	1~10	5	○	75

Function code	Name	Parameter details	Reserved	Mod	No.
F4.07	Terminal control running mode	0: 2-wire control mode 1 1: 2-wire control mode 2 2: 3-wire control mode 1 3: 3-wire control mode 2	0	◎	76
F4.08	UP/DOWN setting change rate	0.01~50.00Hz/s	0.50Hz/s	○	77
F4.09	AI1 lower limit	0.00V~10.00V	0.00V	○	78
F4.10	AI1 lower-limit corresponding setting	-100.0%~100.0%	0.0%	○	79
F4.11	AI1 upper limit	0.00V~10.00V	10.00V	○	80
F4.12	AI1 upper-limit corresponding setting	-100.0%~100.0%	100.0%	○	81
F4.13	AI1 input filter time	0.00s~10.00s	0.10s	○	82
F4.14	AI2 lower limit value	0.00V~10.00V	0.00V	○	83
F4.15	AI2 lower-limit corresponding setting	-100.0%~100.0%	0.0%	○	84
F4.16	AI2 upper limit value	0.00V~10.00V	10.00V	○	85
F4.17	AI2 upper-limit corresponding setting	-100.0%~100.0%	100.0%	○	86
F4.18	AI2 input filter time	0.00s~10.00s	0.10s	○	87
F4.19	HDI function selection	0: Reference input 1: Length input 2: High-speed count input	0	○	88
F4.20	HDI lower limit frequency	0.0kHz~50.0kHz	0.0kHz	○	89
F4.21	HDI lower limit corresponding setting	-100.0%~100.0%	0.0%	○	90
F4.22	HDI upper limit frequency	0.0 kHz~50.0kHz	50.0kHz	○	91
F4.23	HDI upper limit	-100.0%~100.0%	100.0%	○	92

Function code	Name	Parameter details	Reserved	Mod	No.
	frequency corresponding setting				
F4.24	HDI frequency input filter time	0.00s~10.00s	0.10s	○	93
Group F5 Output terminals					
F5.00	OUT open collector output selection	0: No output 1: Running 2: Run forward 3: Run reverse 4: Fault output 5: FDT reached 6: Frequency reached 7: Zero speed running 8: Preset count value reached 9: Specified count value reached 10: Length reached 11: Simple PLC step completed 12: Simple PLC cycle completed 13: Running time reached 14: Upper limit frequency reached 15: Lower limit frequency reached 16: Ready for running 17: Stand-by motor 1 start 18: Stand-by motor 2 start 19~20: Reserved	1	○	94
F5.01	HDO output selection (1.5~2.2kW) Relay OutputTA1, TB1, TC1 (3.7kW or above)		4	○	95
F5.02	Relay output selection		0	○	96
F5.03	FM1 output selection	0: Running frequency 1: Reference frequency 2: Motor speed 3: Output current 4: Output voltage 5: Output power	0	○	97

Function code	Name	Parameter details	Reserved	Mod	No.
F5.04	FM2 output selection	6: Output torque 7: AI1 voltage 8: AI2 voltage /current 9: HDI frequency 10: Length value 11: Count value 12: Reserved	0	○	98
F5.05	FM1 output lower limit	0.0%~100.0%	0.0%	○	99
F5.06	FM1 lower limit corresponding output	0.00~10.00V	0.00V	○	100
F5.07	FM1 output upper limit	0.0%~100.0%	100.0%	○	101
F5.08	FM1 upper limit corresponding output	0.00~10.00V	10.00V	○	102
F5.09	FM2 output lower limit	0.0%~100.00%	0.0%	○	103
F5.10	FM2 lower limit corresponding output	0.00~10.00V	0.00V	○	104
F5.11	FM2 output upper limit	0.0%~100.0%	100.0%	○	105
F5.12	FM2 upper limit corresponding output	0.00~10.00V	10.00V	○	106
Group F6 Enhanced function					
F6.00	Acc time 1	0.1~3600.0s	Depend on model	○	107
F6.01	Dec time 1	0.1~3600.0s	Depend on model	○	108
F6.02	Acc time 2	0.1~3600.0s	Depend on model	○	109
F6.03	Dec time 2	0.1~3600.0s	Depend on model	○	110
F6.04	Acc time 3	0.1~3600.0s	Depend on model	○	111

Function code	Name	Parameter details	Reserved	Mod	No.
F6.05	Dec time 3	0.1~3600.0s	Depend on model	○	112
F6.06	Traverse amplitude	0.0~100.0% (Against reference frequency)	0.0%	○	113
F6.07	Jump frequency amplitude	0.0~50.0% (Against traverse amplitude)	0.0%	○	114
F6.08	Traverse rise time	0.1~3600.0s	5.0s	○	115
F6.09	Traverse fall time	0.1~3600.0s	5.0s	○	116
F6.10	Auto reset times	0: no reset; 1~8: try reset 1~8 times; 9: always try reset	0	○	117
F6.11	Reset interval	0.1~100.0s	1.0s	○	118
F6.12	Setting length	0~65535m	0m	○	119
F6.13	Actual length	0~65535m	0m	●	120
F6.14	Axis pulse number per revolution	1~10000	1	○	121
F6.15	Axis perimeter	0.01~100.00cm	10.00cm	○	122
F6.16	Length ratio	0.001~10.0	1.000	○	123
F6.17	Length correction coefficient	0.001~1.000	1.000	○	124
F6.18	Setting count value	F6.19~65535	0	○	125
F6.19	Given count value	0~F6.18	0	○	126
F6.20	Setting running time	0~65535h	65535h	○	127
F6.21	FDT level detection value	0.00~F0.01	50.00Hz	○	128
F6.22	FDT hysteresis detection value	0.0~100.0% (FDT level)	5.0%	○	129
F6.23	Frequency reached detection amplitude	0.0~100.0% (Highest frequency)	0.0%	○	130
F6.24	Droop control	0.00~10.00Hz	0.00Hz	○	131

Function code	Name	Parameter details	Reserved	Mod	No.
F6.25	Stand-by motor enable	0: No stand-by motor 1: Stand-by motor 1 is enabled 2:Stand-by motor 2 is enabled 3: Both of stand-by motor1, 2 are enabled	0	○	132
F6.26	Stand-by motor1 start/stop delay time	0.0~3600.0s	5.0s	○	133
F6.27	Stand-by motor2 start/stop delay time	0.0~3600.0s	5.0s	○	134
F6.28	Brake threshold voltage	115.0~140.0% (Standard bus voltage) (380V class)	130.0%	○	135
		115.0~140.0% (Standard bus voltage) (220Vclass)	120.0%		
F6.29	Cooling fan running mode	0: Normal run 1: Always run 2: Always stop	0	○	136
Group F7 Protection parameter					
F7.00	Output phase failure protection	0: Disabled 1: Enabled	1	○	137
F7.01	Inverter overload protection selection	0: Disabled. 1: Enabled.	1	◎	138
F7.02	Inverter overload protection current	20.0～130.0%	100%	○	139
F7.03	Motor overload protection	0: Disabled 1: Normal motor 2: Variable frequency motor	1	◎	140
F7.04	Motor overload protection current	20.0%~120.0% (Rated current of the motor)	100.0%	○	141
F7.05	Threshold of trip-free	70.0~110.0% (Standard bus voltage)	80.0%	○	142
F7.06	Decrease rate of trip-free	0.00Hz~F0.01	0.00Hz	○	143
F7.07	Over voltage stall protection	0: Disabled 1: Enabled	1	○	144

Function code	Name	Parameter details	Reserved	Mod	No.
F7.08	Over voltage stall protection voltage	110~150%	380V: 130% 220V: 120%	○	145
F7.09	Auto current limiting threshold	50~200%	G type: 160% P type: 120%	○	146
F7.10	Frequency decrease rate when current limiting	0.00~100.00Hz/s	10.00Hz/s	○	147
F7.11	Auto current limiting selection	0: Enabled 1: Disable when constant speed	0	○	148
Group F8 PID control					
F8.00	PID preset source selection	0: Keypad (F8.01) 1: AI1 2: AI2 3: HDI 4: Multi-step 5: Communication	0	○	149
F8.01	Keypad PID preset	0.0%~100.0%	0.0%	○	150
F8.02	PID feedback source	0: AI1 1: AI2 2: AI1+AI2 3: HDI 4: Communication	0	○	151
F8.03	PID output characteristic	0: Positive 1: Negative	0	○	152
F8.04	Proportional gain (Kp)	0.00~100.00	1.00	○	153
F8.05	Integral time (Ti)	0.01~10.00s	0.10s	○	154
F8.06	Differential time (Td)	0.00~10.00s	0.00s	○	155
F8.07	Sampling cycle (T)	0.01~100.00s	0.10s	○	156
F8.08	Bias limit	0.0~100.0%	0.0%	○	157

Function code	Name	Parameter details	Reserved	Mod	No.
F8.09	Feedback lost detecting value	0.0~100.0%	0.0%	○	158
F8.10	Feedback lost detecting time	0.0~3600.0s	1.0s	○	159
Group F9 Simple PLC and multi-step speed control					
F9.00	Simple PLC mode	0: Stop after one cycle 1: Hold last frequency after once cycle 2: Circular run	0	○	160
F9.01	Simple PLC status saving after power off	0: Disabled 1: Enabled	0	○	161
F9.02	Multi-step speed 0	-100.0~100.0%	0.0%	○	162
F9.03	0^{th} running time	0.0~6553.5s (m)	0.0s	○	163
F9.04	Multi-step speed 1	-100.0~100.0%	0.0%	○	164
F9.05	1^{st} running time	0.0~6553.5s (m)	0.0s	○	165
F9.06	Multi-step speed 2	-100.0~100.0%	0.0%	○	166
F9.07	2^{nd} running time	0.0~6553.5s (m)	0.0s	○	167
F9.08	Multi-step speed 3	-100.0~100.0%	0.0%	○	168
F9.09	3^{rd} running time	0.0~6553.5s (m)	0.0s	○	169
F9.10	Multi-step speed 4	-100.0~100.0%	0.0%	○	170
F9.11	4^{th} running time	0.0~6553.5s (m)	0.0s	○	171
F9.12	Multi-step speed 5	-100.0~100.0%	0.0%	○	172
F9.13	5^{th} running time	0.0~6553.5s (m)	0.0s	○	173
F9.14	Multi-step speed 6	-100.0~100.0%	0.0%	○	174
F9.15	6^{th} running time	0.0~6553.5s (m)	0.0s	○	175
F9.16	Multi-step speed 7	-100.0~100.0%	0.0%	○	176
F9.17	7^{th} running time	0.0~6553.5s (m)	0.0s	○	177
F9.18	Multi-step speed 8	-100.0~100.0%	0.0%	○	178
F9.19	8^{th} running time	0.0~6553.5s (m)	0.0s	○	179

Function code	Name	Parameter details	Reserved	Mod	No.
F9.20	Multi-step speed 9	-100.0~100.0%	0.0%	○	180
F9.21	9th running time	0.0~6553.5s (m)	0.0s	○	181
F9.22	Multi-step speed 10	-100.0~100.0%	0.0%	○	182
F9.23	10th running time	0.0~6553.5s (m)	0.0s	○	183
F9.24	Multi-step speed 11	-100.0~100.0%	0.0%	○	184
F9.25	11th running time	0.0~6553.5s (m)	0.0s	○	185
F9.26	Multi-step speed 12	-100.0~100.0%	0.0%	○	186
F9.27	12th running time	0.0~6553.5s (m)	0.0s	○	187
F9.28	Multi-step speed 13	-100.0~100.0%	0.0%	○	188
F9.29	13th running time	0.0~6553.5s (m)	0.0s	○	189
F9.30	Multi-step speed 14	-100.0~100.0%	0.0%	○	190
F9.31	14th running time	0.0~6553.5s (m)	0.0s	○	191
F9.32	Multi-step speed 15	-100.0~100.0%	0.0%	○	192
F9.33	15th running time	0.0~6553.5s (m)	0.0s	○	193
F9.34	Simple PLC 0~7th section acc/dec time	0~0xFFFF	0	○	194
F9.35	Simple PLC 8~15th section acc/dec time	0~0xFFFF	0	○	195
F9.36	Simple PLC restart selection	0: Restart from step 0 1: Continue from paused step	0	◎	196
F9.37	Time unit	0: Second 1: Minute	0	◎	197
Group FA Display interface					
FA.00	Reserved				198
FA.01	Reserved				199
FA.02	Reserved				200
FA.03	QUICK/JOG function selection	0: Jog 1: FWD/REV switching 2: Clear UP/DOWN setting 3: Quick debugging mode 1	0	○	201

Function code	Name	Parameter details	Reserved	Mod	No.
		4: Quick debugging mode 2 5: Quick debugging mode 3			
FA.04	STOP/RST stop function selection	0: Valid when keypad control 1: Valid when keypad or terminal control 2: Valid when keypad or communication control 3: Always valid	0	○	202
FA.05	Reserved				203
FA.06	Running status display selection 1	0~0xFFFF BIT0: Output frequency BIT1: Reference frequency BIT2: DC bus voltage BIT3: Output voltage BIT4: Output current BIT5: Running speed BIT6: Linear speed BIT7: Output power BIT8: Output torque BIT9: PID preset BIT10: PID feedback BIT11: Input terminal status BIT12: Output terminal status BIT13: Length value BIT14: Count value BIT15: Step no. of PLC or multi-step	0x07FF	○	204
FA.07	Running status display parameter selection 2	0~0xFFFF BIT0: AI1 BIT1: AI2 BIT2: HDI frequency BIT3: Load percentage of motor BIT4: Load percentage of inverter BIT5: Accumulated running time BIT6~15: Reserved	0x0000	○	205

Function code	Name	Parameter details	Reserved	Mod	No.
FA.08	Stop status display parameter	0~0xFFFFF BIT0: Reference frequency BIT1: DC bus voltage BIT2: Input terminal status (No unit) BIT3: Output terminal status BIT4: PID preset BIT5: PID feedback BIT6: AI1 BIT7: AI2 BIT8: HDI frequency BIT9: Step no. of PLC or multi-step BIT10~BIT15: Reserved	0x00FF	○	206
FA.09	Speed display coefficient	0.1~999.9% Actual mechanical speed =120*output frequency *FA.09/Number of poles of motor	100.0%	○	207
FA.10	Linear speed display coefficient	0.1~999.9% Linear speed= actual mechanical speed * FA.10	1.0%	○	208
FA.11	Inverter temperature	0~100℃		●	209
FA.12	Software version			●	210
FA.13	Accumulated running time	0~65535h		●	211

Function code	Name	Parameter details	Reserved	Mod	No.
FA.14	Third latest fault type	0: No failure 1:Inverter unit protection (FLt) 2: Reserved 3: Reserved 4: Acc over-current (OC1) 5: Dec over-current (OC2) 6: Constant speed over-current (OC3) 7: Acc over voltage (OE1) 8: Dec over voltage (OE2) 9: Constant speed over voltage (OE3) 10:Bus under-voltage failure (Uv) 11:Motor overload (OL1) 12: Over load (OL2) 13: Reserved 14: Output phase failure (SPO) 15: Over heat (Ot) 16: Reserved 17: External fault (EF) 18:Communication error (CE) 19:Current detection error (ItE) 20: Motor self-learning error (tE) 21: EEPROM operation error (Err) 22:PID feedback disconnection error (PIDE) 23: Braking unit fault (bCE) 24: Reserved			212
FA.15	Second latest fault type				213
FA.16	Latest fault Purpose				214
FA.17	Present fault output frequency			●	215
FA.18	Present fault output current			●	216
FA.19	Present fault bus voltage			●	217
FA.20	Present fault input terminal status			●	218
FA.21	Present fault output terminal status			●	219

Function code	Name	Parameter details	Reserved	Mod	No.
Group Fb Motor parameter					
Fb.00	Motor parameter auto-tuning	0: No action 1: Parameter overall auto-tuning 2: Parameter static auto-tuning	0	◎	220
Fb.01	Power rating	0.4~400.0kW	Depend on model	◎	221
Fb.02	Rated motor frequency	0.01Hz~F0.01	50.00Hz	◎	222
Fb.03	Rated motor speed	0~36000rpm	Depend on model	◎	223
Fb.04	Rated motor voltage	0~460V	Depend on model	◎	224
Fb.05	Rated motor current	0.8~800.0A	Depend on model	◎	225
Fb.06	Motor stator resistance	0.001~65.535Ω	Depend on model	○	226
Fb.07	Motor rotor resistance	0.001~65.535Ω	Depend on model	○	227
Fb.08	Inductance of stator / rotor	0.1~6553.5mH	Depend on model	○	228
Fb.09	Inductance of stator / rotor	0.1~6553.5mH	Depend on model	○	229
Fb.10	Motor no-load current	0.01~655.35A	Depend on model	○	230
Group FC Serial communication					
FC.00	Local communication address	1~254, 0 is broadcast address	1	○	231
FC.01	Communication baud rate	0: 1200bps 1: 2400bps	3	○	232

Function code	Name	Parameter details	Reserved	Mod	No.
		2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps			
FC.02	Data format	0: No parity check (N, 8, 1) for RTU 1: Even parity check (E, 8, 1) for RTU 2: Odd parity check (O, 8, 1) for RTU 3: No parity check (N, 8, 2) for RTU 4: Even parity check (E, 8, 2) for RTU 5: Odd parity check (O, 8, 2) for RTU 6: No parity check (N, 7, 1) for ASCII 7: Even parity check (E, 7, 1) for ASCII 8: Odd parity check (O, 7, 1) for ASCII 9: No parity check (N, 7, 2) for ASCII 10: Even parity check (E, 7, 2) for ASCII 11: Odd parity check (O, 7, 2) for ASCII 12: No parity check (N, 8, 1) for ASCII 13: Even parity check (E, 8, 1) for ASCII 14: Odd parity check (O, 8, 1) for ASCII 15: No parity check (N, 8, 2) for ASCII 16: Even parity check (E, 8, 2) for ASCII	1	○	233

Function code	Name	Parameter details	Reserved	Mod	No.
		17: Odd parity check (O, 8, 2) for ASCII			
FC.03	Communication response delay	0~200ms	5	○	234
FC.04	Communication timeout failure time	0.0 (invalid) , 0.1~100.0s	0.0s	○	235
FC.05	Communication error processing action selection	0: Alarm and Coast to stop 1: No alarm and go on running 2: No alarm and stop at the stop mode (on under communication control mode) 3: No alarm and stop at the stop mode (under all control mode)	1	○	236
FC.06	Communication processing action selection	LED units digit is 0: write operation with response LED units digit is 1: write operation with no response LED tens digit is 0: communication setting value don't memory when power down LED tens digit is 1: communication setting value memories when power down	0	○	237
Group Fd Model selection					
Fd.00	Purpose selection	0: General purpose 1: Fan and pump purpose	0	◎	238
Group FE Factory setting					
FE.00	Factory password	0~65535	*****	○	254