SY3000 Vector Model Instruction Manual

SHANGHAI SANYU INDUSTRY CO., LTD.

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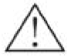
Chapter One Security Information

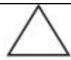
1.1 Safety Information Symbols and Definitions

The safety clauses described in this user manual are very important. They can ensure that you use the inverter safely and prevent yourself or people around you from being injured or property in the work area from being damaged. Please be fully familiar with the following icons and their meanings, and be sure to follow the precautions indicated before continuing to read this user manual.

This symbol indicates that failure to follow the instructions may result in death or serious injury.



This symbol indicates that if you do not follow the instructions, It will cause moderate personal injury or minor injury and certain material losses.



This symbol indicates matters that require attention during operation or use.

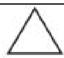
This symbol prompts the user with some useful information.

The following two icons are supplementary explanations to the above signs:

Indicates something that must never be done.

Indicates something that must be done.

1.2 Scope of use



This inverter is suitable for general industrial three-phase AC asynchronous motors.

● This inverter cannot be used in equipment that may threaten life or harm the human body due to inverter failure or working error (nuclear power control equipment, aerospace equipment, transportation equipment, life support systems, safety equipment, weapon systems, etc.). If it is required for special purposes, please consult our company in advance.

● This product is manufactured under the supervision of a strict quality management system, but when used in important equipment, safety protection measures must be taken to prevent the scope of the accident from expanding when the inverter fails.

1.3 Installation Environment

● Install indoors in a well-ventilated place. Generally, it should be installed vertically to ensure the best cooling effect. When installed horizontally, additional ventilation devices may be required.

● The ambient temperature is required to be within the range of -10 to 40 °C. If the temperature exceeds 40 °C, please remove the upper cover. If it exceeds 50 °C, external forced cooling or derating is required . It is recommended that users do not use the inverter in such a high temperature environment, as this will greatly reduce the service life of the inverter.

● The ambient humidity should be lower than 90% with no condensation.

● Install the inverter in a place where the vibration is less than 0.5G to prevent it from falling and being damaged. Do not allow the inverter to be subjected to sudden impact.

● Install in an environment away from electromagnetic fields and free of flammable and explosive substances.

1.4 Installation Safety Matters

● It is strictly forbidden to operate with wet hands.

● It is strictly forbidden to carry out wiring work when the power supply is not completely disconnected.

● When the inverter is powered on and running, do not open the cover or perform wiring operations, otherwise there is a risk of electric shock.

● When performing wiring, inspection and other operations, the work must be done 10 minutes after turning off the power supply, otherwise there is a risk of electric shock.

● Do not install or use an inverter with damaged or missing components to prevent personal accidents and property losses.

● The main circuit terminals and cables must be firmly connected. Otherwise, the inverter may be damaged due to poor contact.

● For safety reasons, the grounding terminal of the inverter must be reliably grounded to avoid the influence of grounding common impedance interference. The grounding of multiple inverters should adopt the single-point grounding method, as shown in Figure 1-1 .

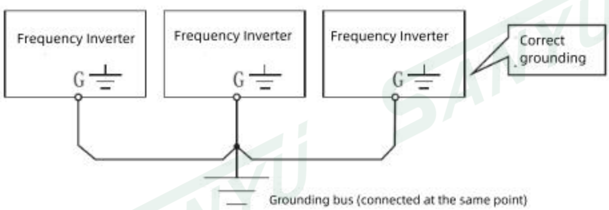


Figure 1-1

● It is strictly forbidden to connect the AC power supply to the inverter output terminals U , V , W , otherwise it will cause damage to the inverter, as shown in Figure 1-2 .

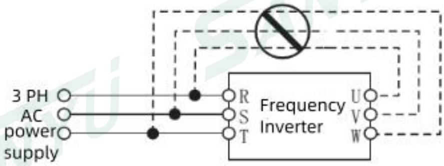


Figure 1-2

● On the input power side of the inverter, be sure to configure a non-fuse circuit breaker for circuit protection to prevent the expansion of accidents caused by inverter failure.

● It is not advisable to install electromagnetic contactor on the output side of the inverter. This is because the contactor will be switched on and off when the motor is running, which will generate operating overvoltage and damage the inverter. However, it is still necessary to configure it for the following three situations:

The frequency converter used for energy-saving control is used when the system often operates at the rated speed. In order to achieve economical operation, the frequency converter needs to be cut off.

When involved in important process flows, cannot be shut down for a long time, and need to switch between various control systems to improve system reliability.

When one inverter controls multiple motors, users should note that the contactor should not operate when the inverter has output!

1.5 Safety precautions

● It is strictly forbidden to operate with wet hands.

● For inverters that have been stored for more than 1 year, the voltage should be gradually increased to the rated value using a voltage regulator when powered on, otherwise there is a risk of electric shock and explosion.

● Do not touch the inside of the inverter after power-on. Do not put rods or other objects into the inverter, otherwise it may cause electric shock or the inverter may not work properly.

● When the inverter is powered on, please do not open the cover. Otherwise there is a risk of electric shock.

● Use the power-off restart function with caution, otherwise it may cause personal injury or death.

● If the operation exceeds 50Hz , the speed range of the motor bearings and mechanical devices must be ensured.

● Mechanical devices that require lubrication, such as reduction gears and gears, should not be run at low speeds for a long time, otherwise their service life will be reduced or even the equipment will be damaged.

● When ordinary motors run at low frequencies, the heat dissipation effect becomes poor and they must be used at a reduced rating. If the load is constant torque, forced heat dissipation or a dedicated variable frequency motor must be used.

● If the inverter is not used for a long time, please be sure to cut off the input power to avoid damage to the inverter or even fire due to foreign objects entering or other reasons.

● Since the output voltage of the inverter is a PWM pulse wave, please do not install capacitors or surge current absorbers (such as varistor) at its output end, otherwise it will cause the inverter to trip or even damage the power components. If they are already installed, please be sure to remove them. See Figure 1-3 .

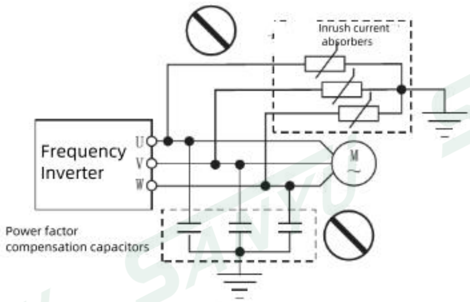


Figure 1-3

● Before using the motor for the first time or reusing it after being stored for a long time, the motor insulation should be checked and the measured insulation resistance should be ensured to be no less than 5MΩ .

● If you need to use the inverter outside the allowable operating voltage range, you need to configure a step-up or step-down device for voltage conversion.

● In areas with an altitude of more than 1000 meters, the heat dissipation effect of the inverter will become worse due to the thin air, and it needs to be derated. Generally, the derate should be about 10% for every 1000m increase in altitude . See Figure 1-4 for the derating curve .

Chapter two Product Standard Specifications

2.1 Technical Specifications

Enter	Rated voltage, frequency	Three-phase AC 380V; 50/60Hz Single-phase AC 220 V; 50/60 Hz	
	Voltage allowed Range of change	Three - phase AC 360V ~ 450V Single - phase AC 190V ~ 250V	
Output	Voltage	0 ～ 460V 0 ～ 260V	
	Frequency	Vector control: 0～500Hz V/F control: 0～500Hz	
	Overload capacity	G type machine: 150% rated current for 60s; 180% rated current for 3s. P-type machine: 120% rated current for 60s; 150% rated current for 3s.	
Control Method		V/F control, speed sensorless vector control (SVC)	
Control characteristics	Frequency setting Resolution	Analog input	Maximum frequency×0.025%
		Digital settings	0.01Hz
	V/F control	V/F Curve	Three types: linear type; multi-point type; N-th power type V/F curve (1.2, 1.4, 1.6, 1.8, 2)
		V/F separation	2 methods: full separation, semi-separation
		Torque boost	Manual setting: 0.0～30.0% of rated output Automatic boost: Automatically determine the boost torque based on the output current and motor parameters
		Automatic current and voltage limiting	Whether in acceleration, deceleration or stable operation, it can automatically detect the motor stator current and voltage, and suppress them within the allowable range based on a unique algorithm, minimizing the possibility of system fault tripping.
Control characteristics	Sensorless vector control	Voltage frequency characteristics	Automatically adjust the output voltage-frequency ratio according to motor parameters and unique algorithm
		Torque characteristics	Starting torque: 150% rated torque at 3.0Hz (V/F control) 150% rated torque at 0.25Hz (speed sensorless vector control)

			Operating speed steady-state accuracy: ≤±0.2% rated synchronous speed Speed fluctuation: ≤±0.5% rated synchronous speed Torque response: ≤20ms (speed sensorless vector control)
		Motor parameter self-determination	Without any restrictions, the automatic detection of parameters can be completed in both static and dynamic conditions of the motor to obtain the best control effect
		Current and voltage suppression	Full current closed-loop control, completely avoiding current shock, with perfect over-current and over-voltage suppression function
	Undervoltage suppression during operation	Especially for users with low grid voltage or frequent grid voltage fluctuations, the system can maintain the longest possible operating time based on unique algorithms and residual energy allocation strategies even when the voltage is below the allowable range.	
Typical functions	Multi-speed and swing frequency operation	16-segment programmable multi-speed control, multiple operating modes optional. Swing frequency operation: preset frequency, center frequency adjustable, state memory and recovery after power failure	
	PID Control RS485 Communication	Built-in PID controller (frequency can be preset), standard configuration RS485 communication function	
	Frequency setting	Analog Input	DC voltage 0~10V, DC current 0~20mA (upper and lower limits are optional)
		Digital Input	Operation panel setting, RS485 interface setting, UP/DOWN terminal control, and multiple combination settings with analog input
	output signal	Digital Output	1 Y-terminal open collector output, 1 DO high-speed pulse output (optional as open collector output) and 2 programmable relay outputs (TA, TB, TC), up to 58 meaning options
		Analog Output	2-way analog signal output, the output range is flexibly set between 0~20mA or 0~10V, which can realize the output of

				physical quantities such as set frequency and output frequency
	Automatic voltage stabilization operation		According to the needs, you can choose dynamic voltage stabilization, static voltage stabilization, and non-stabilization to obtain the most stable operation effect.	
	Acceleration and deceleration time setting		0.0s～6500.0s can be set continuously, S-shaped and linear modes are optional	
	brake	Energy consumption brake	Dynamic braking starting voltage, hysteresis voltage and dynamic braking rate can be adjusted continuously	
		DC brake	DC braking start frequency at shutdown: 0.00～[F00.10] maximum frequency Braking time: 0.0～100.0s; Braking current: 0%～100% rated current	
	Low noise operation		The carrier frequency is continuously adjustable from 0.5KHz to 16.0KHz to minimize motor noise	
	Speed tracking speed Restart function		It can realize the smooth restart and instantaneous stop restart function of the running motor	
	counter		One internal counter for easy system integration	
	Run function		Upper and lower frequency limit setting, frequency jump operation, reverse operation limit, slip frequency compensation, RS485 communication, frequency increase and decrease control, fault self-recovery operation, etc.	

show	Operation panel display	run state	Output frequency, output current, output voltage, motor speed, set frequency, module temperature, PID setting, feedback, analog input and output, etc.
		Call the police content	There are eight operating parameter records including output frequency, set frequency, output current, output voltage, DC voltage, module temperature, power-on time, and operating time when three faults trip.
Protective function			Overcurrent, overvoltage, undervoltage, module failure, electronic thermal relay, overheating, short circuit, input and output phase loss, abnormal motor parameter tuning, internal memory failure, etc.
environment	Ambient temperature		-10℃～+40℃ (When the ambient temperature is 40℃～50℃, please use it at a reduced rating)
	Ambient humidity		5%～95%RH, no condensation
	surroundings		Indoors (no direct sunlight, no corrosion, no flammable gas, no oil mist, dust, etc.)

	altitude	Derate for use above 1000 meters, 10% for every 1000 meters increase
structure	Protection level	IP20
	cooling method	Air cooling, with fan control
Installation		Wall-mounted, cabinet-type

2.2 Inverter model description

SY3000 – 0R7G- 4

Inverter Series

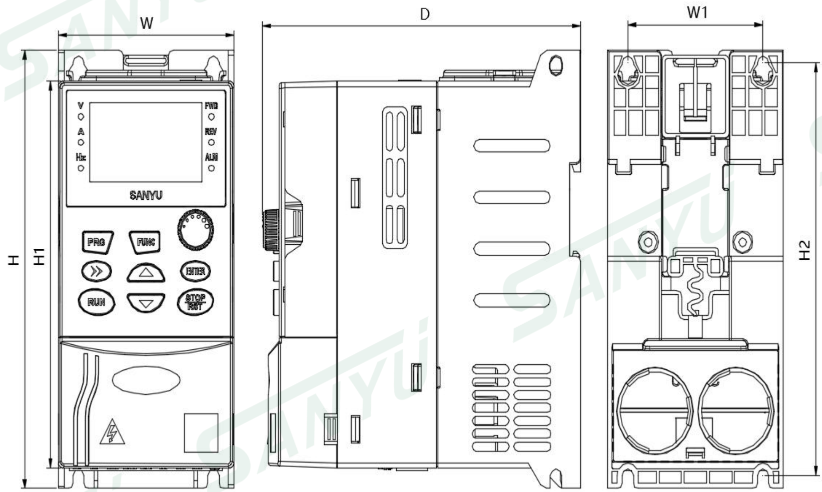
No.	Adaptation
0R7	0. 75kW
1R5	1. 5kW
011	11kW
018	18. 5kW
110	110kW
400	400kW

No.	Voltage
S2	Single-phase220V
2	Three-phase220V
4	Three-phase380V
6	Three-phase480V

No.	Inverter Type
G	General type
P	Fan pump type

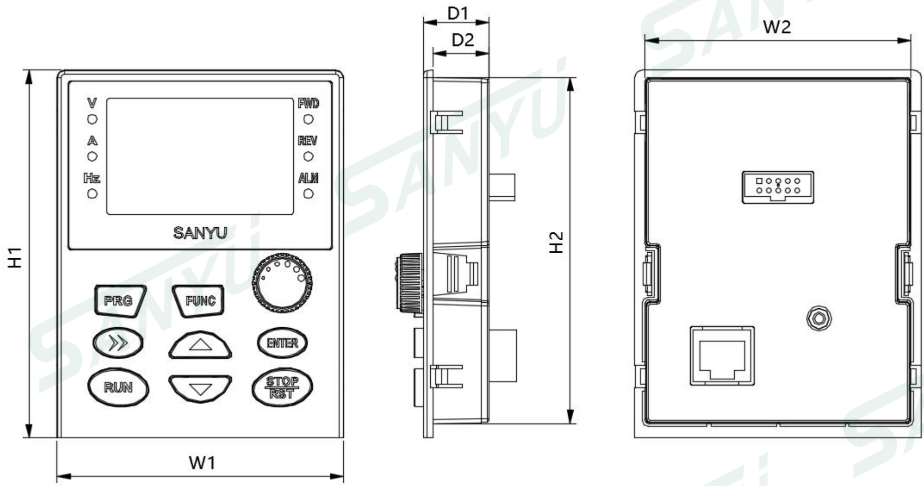
2.3 Chassis and keyboard dimensions

Chassis Dimensions:



Model	H2 (mm)	W1 (mm)	H (mm)	H1 (mm)	W (mm)	D (mm)	Mounting holes (mm)
	Installation dimensions		Periphery dimensions				
0.4KW-2.2KW	160.2	60	170	150	78	141.5	4
3.7KW-5.5KW	200	78	212	180	95	158.2	4
7.5KW-11KW	230	129	240	/	140	187.2	5
15KW-22KW	298	135	312	280	166	200.2	6

Keyboard installation dimensions:



键盘外形和开孔尺寸				键盘高度	
W1	H1	W2	H2	D1	D2
76.8	98.5	71.3	92.7	17.6	15.1

External keyboard installation dimensions

2.4 Rated current output table

Voltage	Simplex	Three-phase

	220V	220V(240V)	380V(415V)
Power (KW)	Current (A)	Current (A)	Current (A)
0.4	2.3	2.3	-
0.75	4	4	2.1
1.5	7	7	3.8
2.2	9.6	9.6	5.1
4	17	17	8.5
5.5	25	25	13
7.5	-	-	16
11	-	-	24
15	-	-	32
18.5	-	-	36
22	-	-	44
30	-	-	58
37	-	-	70
45	-	-	90
55	-	-	110
75	-	-	152
93	-	-	172
110	-	-	205
132	-	-	253
160	-	-	304
200	-	-	380
220	-	-	426
250	-	-	465
280	-	-	520
315	-	-	585
355	-	-	650
400	-	-	725
450	-	-	820

2.5 Braking resistor selection table

Voltage (V)	Inverter power (KW)	Braking resistor specifications		Braking torque
		W	ohm	10%ED
Single phase 220 series	0.4	80	200	125
	0.75	80	150	125
	1.5	100	100	125
	2.2	100	70	125
	4.0	300	50	125
Three-phase 220 series	0.75	150	110	125
	1.5	250	100	125
	2.2	300	65	125
	4	400	45	125
	5.5	800	twenty two	125
	7.5	1000	16	125
Three-phase 380 series	0.75	100	750	125
	1.5	300	400	125
	2.2	300	250	125

Voltage (V)	Inverter power (KW)	Braking resistor specifications		Braking torque
		W	ohm	10%ED
	4	400	150	125
	5.5	500	100	125
	7.5	1000	75	125
	11	3000	43	125
	15	3000	32	125
	18.5	3000	25	125
	22	4000	22	125
	30	5000	16	125
	37	6000	13	125
	45	6000	10	125
	55	6000	10	125
	75	7500	6.3	125
	93	9000	9.4/2	125
	110	11000	9.4/2	125
	132	13000	6.3/2	125
	160	16000	6.3/2	125
	200	20000	2.5	125
	220	22000	2.5	125
	250	25000	2.5/2	125
	280	28000	2.5/2	125
	315	32000	2.5/2	125
	355	34000	2.5/2	125
	400	42000	2.5/3	125
	450	45000	2.5/3	125

Notice:

1. Please select the resistance value specified by our company.
2. If the use of brake resistors not provided by our company causes damage to the inverter or other equipment, our company will not bear any responsibility.
3. When installing the brake resistor, be sure to consider the safety and flammability of the environment and keep it at least 100mm away from the inverter .
4. The parameters in the table are for reference only and are not used as standards.

Chapter Three Storage and installation

3.1 Storage

This product must be placed in the packaging box before installation. If it is not used temporarily, please pay attention to the following points when storing it:

● Must be placed in a dust-free, dry location;

● Storage environment temperature ranges from -20 ℃ to +65 ℃;

● The relative humidity of the storage environment is within the range of 0% to 95% with no condensation;

● The storage environment does not contain corrosive gases or liquids;

● It is best to place it on a shelf and store it in a well-packaged manner. It is best not to store the inverter for a long time. Long-term storage will cause the electrolytic capacitor to deteriorate. If it needs to be stored for a long time, it must be powered on once every six months for at least 5 hours. When inputting, the voltage must be slowly increased to the rated voltage value using a voltage regulator.

3.2 Installation location and environment

Note: The environment of the installation site will affect the service life of the inverter. Please install the inverter in the following places:

● Ambient temperature: -5 ～ 40 ℃ ℃ and good ventilation;

● A place without dripping water and low temperature;

● Places without sunlight, high temperature and severe dust;

● A place without corrosive gases and liquids;

● A place with less dust, oil gas and metal powder;

● A place without vibration, easy to maintain and inspect;

● A place without electromagnetic noise interference;

3.3 Installation space and direction

● For the convenience of maintenance, there should be enough space around the inverter, as shown in the figure.

● To achieve good cooling effect, the inverter must be installed vertically and ensure smooth air circulation.

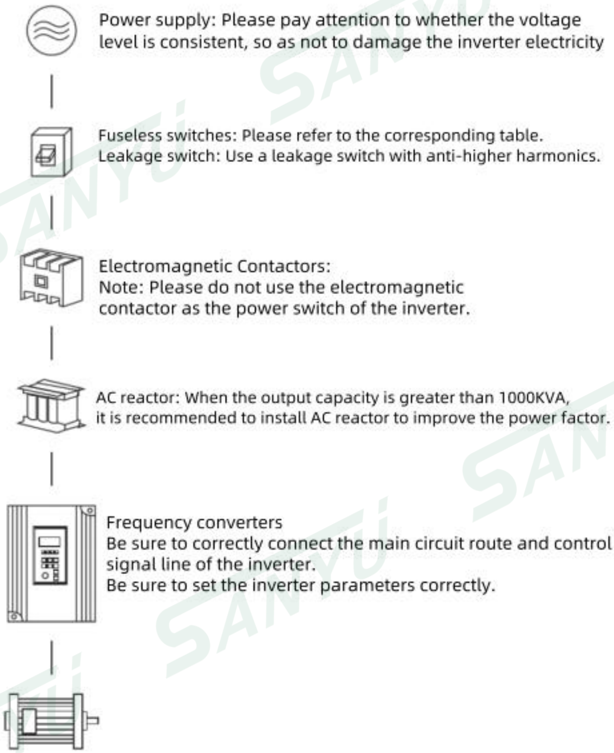
● If the installation is not firm, place a flat plate under the inverter base before installation. If it is installed on a loose surface, the stress may cause damage to the main circuit parts, thus damaging the inverter;

● The wall surface for installation should be made of non-combustible materials such as iron plate.

● When multiple inverters are installed in the same cabinet, use the method of up and down installation. While paying attention to the spacing , please add a guide partition in the middle or install them in an up and down staggered manner.

Chapter Four Wiring

4.1 Main circuit wiring diagram

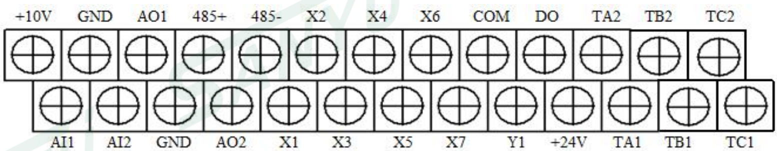


4.2 Terminal diagram

4.2.1 The functions of the main circuit terminals are as follows:

Terminal name	Feature description
R、S、T	Three-phase power input terminal
P+ 、P-	External braking unit reserved terminal
P+ 、PB	External Brake Resistor Reserved Terminal(0.4KW~30.0KW)
P+、P1	External DC reactor top retention terminal
U、V、W	Three-phase AC output terminal
⏚	Ground terminal

4.2.2 Terminals of control circuit

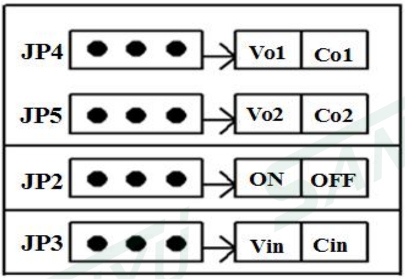


Control circuit terminal function description

Category	Terminal number	Function Description	Specification
Multi-function digital input terminal	X1	It is effective when X (X1, X2, X3, X4, X5, X6, X7) ~ COM are short-circuited, and its function is set by parameters F07.00 ~ F07.06 respectively (common terminal: COM).	INPUT, 0～24V level signal, low level is effective, 5mA.
	X2		
	X3		
	X4		
	X5		
	X6		
	X7	In addition to being used as a common multi-function terminal, X7 can also be programmed as a high-speed pulse input port. For details, see the F07.06 function description.	
Analog input and output terminals	AI1	AI1 receives analog voltage/current input. Voltage and current are selected by jumper JP3. The factory default input voltage. If you want to input current, just adjust the jumper cap to the Cin position; AI2 only receives voltage input. For range setting, see the description of function code F07.13~F07.22. (Reference ground: GND)	INPUT, input voltage range: 0~10V (input impedance: 100KΩ), input current range: 0~20mA (input impedance: 500Ω).
	AI2		
	AO1	AO1 provides analog voltage/current output, which can represent 16 physical quantities. The output voltage and current are selected by jumper JP4. The factory default output voltage is set. If you want to output current, just jump the jumper cap to	OUTPUT, 0~10V DC voltage. The output voltage of AO1 and AO2 terminals is the PWM waveform from the CPU. The output voltage is proportional to the width of the PWM waveform.
	AO2		

		Co1 position; see the function code F08.07 and F08.08 for details. (Reference ground: GND)	
Relay output	TA1 TB1 TC1 TA2 TB2 TC2	Programmable and defined as multi-function relay output terminals, up to 44 types. For details, see F08.02 and F08.03 output terminal function introduction.	TA1-TB1 and TA2-TB2 are normally closed; TA1-TC1 and TA2-TC2 are normally open. Contact capacity: 250VAC/2A (COSΦ=1); 250VAC/1A (COSΦ=0.4), 30VDC/1A.
Digital Output	Y1	Open collector output terminal, up to 44 types. For details, see F08.04 output terminal function introduction.	Output voltage range: 0V ~ 24V Output current range: 0mA ~ 50mA
	DO	Programmable pulse signal output terminal with multiple functions, up to 16 types. For details, see F08.06 output terminal function introduction. (Common terminal: COM).	OUTPUT, output frequency range is set by F08.09 and the maximum frequency can reach 100KHz.
Power interface	+24V	+24V is the common power supply for the digital signal input terminal circuit	Maximum output current 200mA
	+10V	+10V is the common power supply for the analog input and output terminals.	Maximum output current 20mA
	COM	Digital signal and +24V power supply reference ground	Internally isolated from GND
	GND	Analog signal and +10V power supply reference ground	Internal isolation from COM
Communication Interface	485+	RS485 signal + terminal	Standard RS485 communication interface, not isolated from GND, please use twisted pair or shielded wire.
	485-	RS485 signal-end	

4.2.3 Toggle switch and corresponding relationship

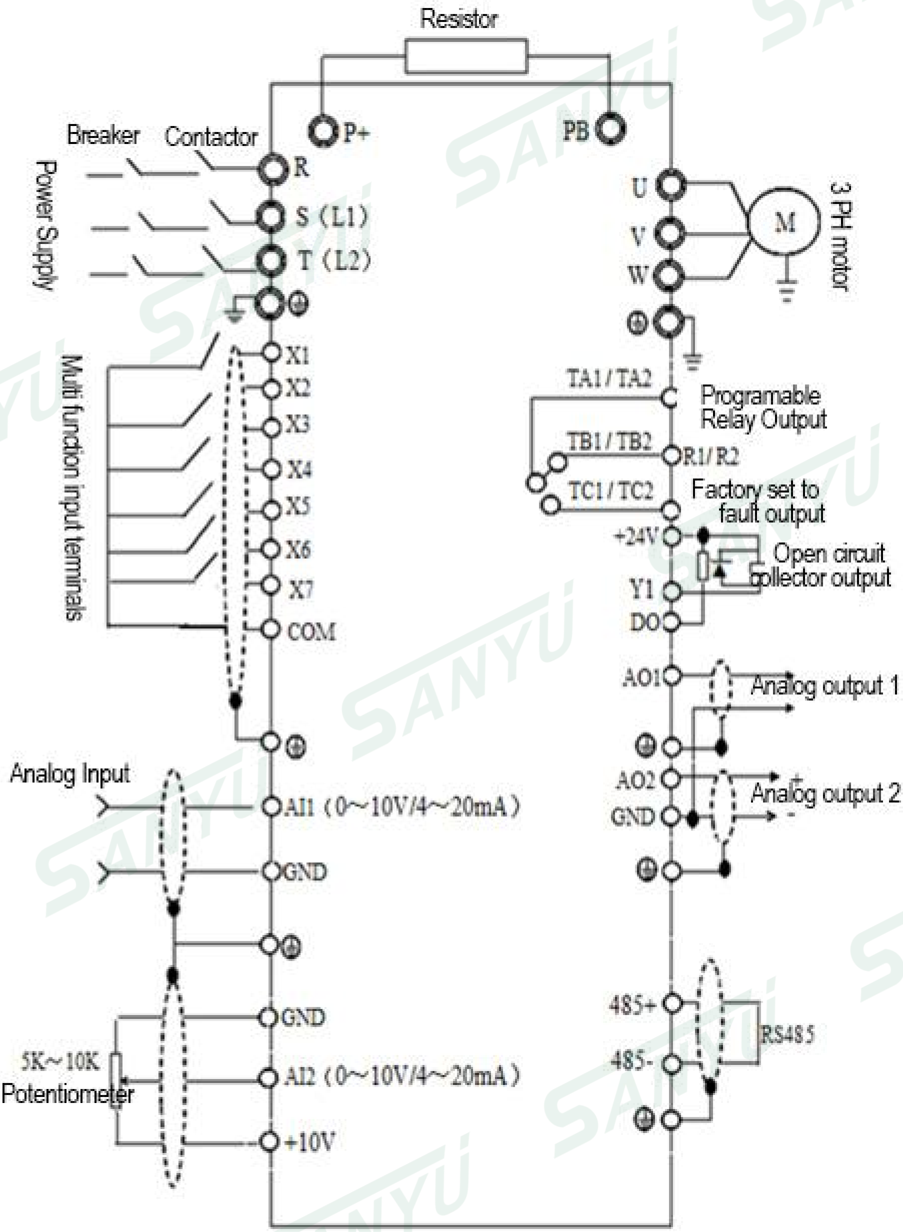


4.2.3 Main control board jumper settings

JP2	
OFF	Indicates that the matching resistor on 485 communication is not connected
ON gear	Indicates the matching resistor connection on 485 communication
JP3	
C in gear	Indicates AI1 input current signal, 4-20mA
V in gear	Indicates AI1 input voltage signal, 0-10V
JP4	
Vo1 file	Indicates AO1 output voltage signal, 0-10V
Co1 block	Indicates AO1 output current signal, 4-20mA
JP 5	
Vo2	Indicates AO2 output voltage signal, 0-10V
Co2 block	Indicates AO2 output current signal, 4-20mA

4.3 Basic wiring diagram

The inverter wiring is divided into the main circuit and the control circuit. The user can open the cover of the shell, then you can see the main circuit terminals and control circuit terminals. The user must accurately connect according to the following wiring circuits.



Basic operation wiring diagram

4.4 Wiring precautions

4.4.1 Main circuit wiring

● When wiring, please select the wire diameter specifications in accordance with the provisions of electrical regulations to ensure safety.

● It is best to use isolated wires or wire tubes for power wiring, and ground both ends of the isolation layer or wire tube;

● Be sure to install an air circuit breaker NPB between the power supply and the input terminals (R , S , T) . (If you use a leakage circuit breaker, please use one with high frequency countermeasures) .

● Please lay out the power line and control line separately and do not place them in the same wire duct.

● Do not connect AC power to the inverter output terminals (U , V , W) ;

● The output wiring must not touch the metal part of the inverter casing, otherwise it may cause a ground short circuit.

● Phase-shifting capacitors, LC and RC noise filters and other components cannot be used at the output end of the inverter.

● The inverter main circuit wiring must be kept away from other control devices.

● When the wiring between the inverter and the motor exceeds 50 meters (220V series) or (100 meters for 380V) , a very high dv/dt will be generated inside the motor coil , which will damage the interlayer insulation of the motor. Please use an AC motor dedicated to the inverter or install a reactor on the inverter side.

● When the distance between the inverter and the motor is long, please reduce the carrier frequency, because the larger the carrier, the greater the high-order harmonic leakage current on the cable, and the leakage current will have an adverse effect on the inverter and other equipment.

4.4.2 Control circuit wiring (signal line)

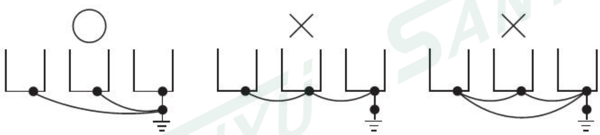
The signal line should not be placed in the same wire duct as the main circuit wiring, otherwise interference may occur. Please use shielded wire for the signal line and ground it at one end. The wire diameter should be 0.5-2mm² . It is recommended to use shielded wire for the control line . Use the control terminals on the control panel correctly as needed.

4.4.3 Grounding wire

Please use the third type of grounding (less than 100 Ω) to ground the grounding terminal E. Please use the grounding wire in accordance with the basic length and size of the electrical equipment. Absolutely avoid sharing the grounding electrode with large power equipment such as welding machines and power machinery. The grounding wire should be kept as far away from the power line of large power equipment as possible. For the grounding wiring method of multiple inverters, please use the method shown in the following figure (a) to avoid loops (b) or (c) .

● The grounding wire must be as short as possible.

● Please ground the grounding terminal E correctly and never connect it to the neutral line.



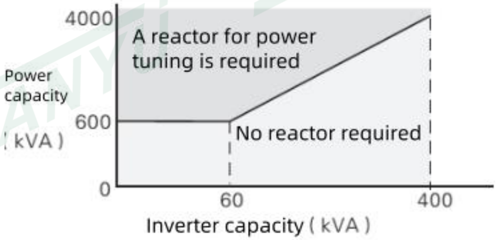
(a)正确 (b)错误 (c)错误

4.5 Specific application considerations

4.5.1 Model selection

(1) Installation of reactor

the inverter is connected to a large-capacity power transformer (600kVA or more) or the phase-advancing capacitor is switched, the power input circuit will generate excessive peak current, which may damage the components of the converter part. To prevent this from happening, please install a DC reactor or AC reactor. This also helps to improve the power factor on the power supply side. In addition, when a thyristor converter such as a DC drive is connected to the same power supply system, a DC reactor or AC reactor must be installed regardless of the power supply conditions .



Installation conditions of the reactor

(2) Inverter capacity

When operating special motors, please confirm that the motor rated current is not higher than the inverter rated output current. In addition, when multiple induction motors are connected in parallel with one inverter, the inverter capacity should be selected so that 1.1 times the total motor rated current is less than the inverter rated output current.

(3) Starting torque

The starting and acceleration characteristics of the motor driven by the inverter are limited by the overload rated current of the combined inverter. Compared with the starting of the general commercial power supply, the torque characteristics are smaller. If a larger starting torque is required, please increase the capacity of the inverter by one level or increase the capacity of the motor and inverter at the same time.

(4) Emergency stop

Although the protection function will be activated and the output will stop when the inverter fails, the motor cannot be stopped suddenly at this time. Therefore, please set a mechanical stop and holding structure on the mechanical equipment that requires emergency stop.

(5) Special options

Terminals PB(+) and P1(+) are for connecting dedicated options. Do not connect any equipment other than dedicated options.

(6) Notes on reciprocating loads

When the inverter is used for reciprocating loads (cranes, elevators, presses, washing machines, etc.), if a current of 150% or more is repeatedly passed through it, the IGBT inside the inverter will suffer from thermal fatigue and its service life will be shortened. As a rough guideline, when the carrier frequency is 4kHz and the peak current is 150% , the number of starts / stops is approximately 8 million times.

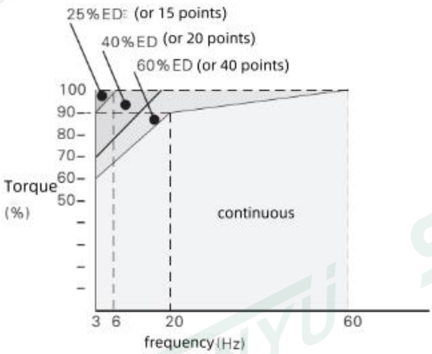
In particular, when low noise is not required, please reduce the carrier frequency. In addition, please reduce the peak current during reciprocation to less than 150% by reducing the load, extending the acceleration and deceleration time, or increasing the inverter capacity by one level . (When conducting trial runs for these purposes, be sure to confirm the peak current during reciprocation and adjust it as needed.) In addition, when used for cranes, since the start / stop action during micro-motion is faster, it is recommended to make the following selections to ensure motor torque and reduce inverter current. The capacity of the inverter should be able to ensure that its peak current is less than 150% . The capacity of the inverter should be at least one level larger than the motor capacity .

4.5.2 Precautions for using the motor

(1) For existing standard motors

Low speed range

Compared with commercial power supply, the loss of standard motors driven by inverters will increase slightly. The cooling effect will be poor in the low speed range, and the temperature of the motor will rise. Therefore, please reduce the load torque of the motor in the low speed range. The allowable load characteristics of our standard motors are shown in the figure. In addition, if 100% continuous torque is required in the low speed range, please consider whether to use a motor dedicated to inverters.



Allowable load characteristics of our standard motors

(2) Notes on use with special motors

The rated current of a pole-changing motor is different from that of a standard motor. Please confirm the maximum current of the motor and select the corresponding inverter. Please be sure to switch the number of poles after the motor stops. If the switch is performed during rotation, the regenerative overvoltage or overcurrent protection circuit will be activated and the motor will stop due to free running.

Motor with brake

When using an inverter to drive a motor with a brake, if the brake circuit is directly connected to the output side of the inverter, the brake will not open due to low voltage at startup. Please use a motor with a brake whose brake power supply is independent, and connect the brake power supply to the power supply side of the inverter. Generally, when using a motor with a brake, the noise may become louder in the low speed range.

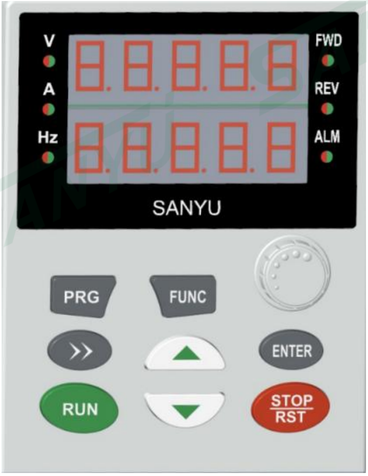
(3) Power transmission structure (reducer, belt, chain, etc.)

When using oil-lubricated gearboxes, speed changers, and reducers in the power transmission system, please note that the oil lubrication effect will be reduced if it is operated continuously only in the low-speed range. In addition, when operating at high speeds above 60Hz , problems such as noise, life, and strength caused by centrifugal force in the power transmission structure will occur, so please pay full attention.

Chapter Five Operation and display

5.1 Operation panel description

5.1.1 Operation panel diagram



5.1.2 Button Description

Key Symbols	name	Function Description
PRG	Programming Keys	Menu entry or exit, parameter modification
ENTER	Confirm key	Enter the menu and confirm parameter settings
▲	Increment key	Increment of data or function code
▼	Decrement key	Decrement of data or function code
▶▶	Shift key	Select parameter modification position and display content
RUN	Run Key	Running operations in keyboard operation mode
STOP/RESET	Stop/Reset button	Stop/Reset Operation
FUNC	Multi-function shortcut keys	Switch selection according to function

5.1.3 Function indicator light description

Indicator light name	illustrate
REV	The inverter reverse indicator light, when it is on, it indicates the reverse running state.
FWD	The inverter forward indicator light, when it is on, it indicates the forward running state.
ALM	If the indicator light is always on, it means it is in torque control state; if the indicator light flashes quickly, it means it is in fault state; if the indicator light flashes slowly, it means it is in tuning state.

Hz	Frequency Unit
A	Current Unit
V	Voltage Unit

5.1.4 Function indicator light combination description :

Indicator light combination	LED display meaning	symbol
H z + A	Motor speed	r/min
A + V	Time (seconds)	s
H z + V	Percentage actual value	%
H z + A + V	temperature	℃

5.2 Operation process

5.2.1 Parameter settings

The three levels of menus are:

1. Function code group number (first level menu);
2. Function code number (secondary menu);
3. Function code setting value (three-level menu).

Note: When operating in the third-level menu, you can press PRG or ENTER to return to the second-level menu. The difference between the two is: pressing ENTER will store the set parameters in the control panel, then return to the second-level menu and automatically transfer to the next function code; pressing PRG will directly return to the second-level menu without storing parameters and remain at the current function code.

In the third-level menu state, if the parameter has no flashing bit, it means that the function code cannot be modified. Possible reasons are:

1) This function code is a parameter that cannot be modified, such as actual detection parameters, operation record parameters, etc.

2) This function code cannot be modified in the running state and can only be modified after stopping the machine.

5.2.2 Fault Reset

After the inverter fails, the inverter will prompt the relevant fault information. The user can reset the fault by pressing the STOP/RESET key on the keyboard or the terminal function. After the inverter fault is reset, it is in standby state. If the inverter is in a fault state and the user does not reset it, the inverter is in a running protection state and cannot run.

5.2.3 Motor parameter self-learning

Select vector control mode. Before the inverter is running, the nameplate parameters of the motor must be accurately entered. This nameplate parameter matches the standard motor parameter; the vector control method is highly dependent on the motor parameters. To obtain good control performance, The accurate parameters of the controlled motor must be obtained.

Chapter Six Function parameter table

If F15.00 is set to a non-zero value, the parameter protection password is set. In the function parameter mode and the user parameter change mode, the parameter menu can only be entered after the password is correctly entered. To cancel the password, set F15.00 to 0. The parameter menu in the user customized parameter mode is not protected by a password.

The symbols in the function table are explained as follows:

"☆": Indicates that the setting value of this parameter can be changed when the inverter is in the stop or running state;

"★": Indicates that the setting value of this parameter cannot be changed when the inverter is in operation;

"●": Indicates that the value of the parameter is the actual test record value and cannot be changed;

"*": Indicates that the parameter is a "factory parameter", which is limited to the manufacturer's setting and users are prohibited from operating it.

F00 Basic function group				
Function code	Name	Predetermined area	Factory default	Change
F00.00	Function macro definition	0: General mode 1: One variable frequency pump and two working modes (1 variable frequency pump + 2 industrial frequency pumps) water supply mode 12: Three pumps circulating soft start (3 variable frequency pumps) water supply mode 3: One variable frequency pump and three working modes (1 variable frequency pump + 3 industrial frequency pumps) water supply mode 4: One variable frequency pump and two working modes (1 variable frequency pump + 2 industrial frequency pumps) water supply mode 25: One variable frequency pump and one working mode (1 variable frequency pump + 1 industrial frequency pump) water supply mode 6: Single pump water supply (1 variable frequency pump) mode 7: Photovoltaic water supply voltage tracking mode 8: Photovoltaic water supply power tracking VF mode 9: Photovoltaic water supply power tracking SVC mode 10~100: Reserved Note:	0	★

		Initialize the parameters first, then set the macro function.		
F00.01	Motor control method	0: V/F control 1: Speed sensorless vector control (SVC)	0	★
F00.02	Command source selection	0: Operation panel command channel 1: Terminal command channel 2: Communication command channel	0	☆
F00.03	Main frequency source A selection	0: Digital setting (preset frequency F00.08, UP/DOWN can be modified, power off no memory) 1: Digital setting (preset frequency F00.08, UP/DOWN can be modified, power off memory) 2: AI1 (0~10V/20mA) 3: AI2 (0~10V) 4: Panel potentiometer 5: PULSE setting (X7) 6: Multi-segment command 7: Simple PLC 8: PID 9: Communication setting 10: Multi-pump command 11: MPPT setting (photovoltaic water supply)	4	★
F00.04	Auxiliary frequency source B selection	Same as F00.03 (main frequency source A selection)	0	★
F00.05	Auxiliary frequency source B range selection when superimposing	0: relative to the maximum frequency 1: relative to frequency source A	0	☆
F00.06	Auxiliary frequency source B range when superimposed	0% ～ 150%	100%	☆

F00.07	Frequency source B superposition selection	Units: Frequency source selection 0: Main frequency source A 1: Main and auxiliary operation results (operation relationship is determined by the tens digit) 2: Switch between main frequency source A and auxiliary frequency source B 3: Switch between main frequency source A and main and auxiliary operation results 4: Switch between auxiliary frequency source B and main and auxiliary operation results Tens: Main and auxiliary operation relationship of frequency source 0: Main + Auxiliary 1: Main - Auxiliary 2: Maximum value of the two 3: Minimum value of the two	OO	☆
F00.08	Preset frequency	0.00Hz～maximum frequency (F00.10)	50.00Hz	☆
F00.09	Running direction	0: Same direction 1: Opposite direction	0	☆
F00.10	Maximum frequency	50.00Hz ～ 50 0.00Hz	50.00Hz	★
F00.11	Upper frequency source	0: F00.12 setting 1: AI12: AI23: Panel potentiometer 4: PULSE setting 5: Communication setting	0	★
F00.12	Upper frequency	Lower limit frequency F00.14 ~ Maximum frequency F00.10	50.00Hz	☆
F00.13	Upper frequency offset	0.00Hz ~ Maximum frequency F00.10	0.00Hz	☆
F00.14	Lower frequency	0.00Hz ~ upper limit frequency F00.12	0.00Hz	☆
F00.15	Carrier frequency	0.5kHz ～ 16.0kHz	Model confirmatio n	☆
F00.16	Carrier frequency adjusts with temperature	0: No 1: Yes	1	☆
F00.17	Acceleration time 1	0.00s ~ 650.00s(F00.19=2) 0.0s ~ 6500.0s(F00.19=1)0s ~ 65000s(F00.19=0)	Model confirmatio n	☆

F00.18	Deceleration time 1	0.00s ~ 650.00s(F00.19=2) 0.0s ~ 6500.0s(F00.19=1)0s ~ 65000s(F00.19=0)	Model confirmation	☆
F00.19	Acceleration and deceleration time unit	0: 1 second 1: 0.1 second 2: 0.01 second	1	★
F00.21	Auxiliary frequency source offset frequency when superimposed	0.00Hz ~ Maximum frequency F00.10	0.00Hz	☆
F00.22	Frequency command resolution	1: 0.1Hz 2: 0.01Hz	2	★
F00.23	Digital setting frequency stop memory selection	0: No memory 1: Memory	0	☆
F00.24	reserve	—	0	★
F00.25	Acceleration/deceleration time reference frequency	0: Maximum frequency (F00.10) 1: Set frequency 2: 100Hz	0	★
F00.26	Frequency command UP/DOWN reference during operation	0: Running frequency 1: Setting frequency	0	★
F00.27	Command source bundled with frequency source	Units: Operation panel command binding frequency source selection 0: No binding 1: Digital setting frequency 2: AI1 3: AI2 4: Panel potentiometer 5: PULSE pulse setting (X7) 6: Multi-speed 7: Simple PLC 8: PID 9: Communication setting Tens: Terminal command binding frequency source selection Hundreds: Communication command binding frequency source selection Thousands: Automatic operation binding frequency source selection	OOOOO	☆
F00.28	Serial communication protocol selection	0: Modbus protocol 1 : Reserved	0	☆
F00.29	GP type display	1: G type (constant torque load type) 2: P type (fan, water pump load type)	Model confirmation	•
F01 Group start and stop control				
Function code	Name	Predetermined area	Factory default	Change

F01.00	Startup method	0: Direct start 1: Speed tracking restart 2: Pre-excitation start (AC asynchronous motor) 3: Super fast start (valid in vector mode)	0	☆
F01.01	Speed tracking mode	0: Start from the stop frequency 1: Start from zero speed 2: Start from the maximum frequency	0	★
F01.02	Speed tracking speed	1 ～ 100	20	☆
F01.03	Start frequency	0.00Hz ～ 10.00Hz	0.00Hz	☆
F01.04	Start frequency holding time	0.0s ～ 100.0s	0.0s	★
F01.05	Starting DC braking current/ pre-excitation current	0% ～ 100%	50%	★
F01.06	Starting DC braking time/ pre-excitation time	0.0s ～ 100.0s	0.0s	★
F01.07	Acceleration and deceleration method	0: Linear acceleration/deceleration 1: S-curve acceleration/deceleration A 2: S-curve acceleration/deceleration B	0	★
F01.08	S curve start time ratio	0.0% ～ (100.0%-F01.09)	30.0%	★
F01.09	S curve end period time ratio	0.0% ～ (100.0%-F01.08)	30.0%	★
F01.10	Shutdown mode	0: deceleration stop 1: free stop	0	☆
F01.11	DC braking start frequency at shutdown	0.00Hz ~ Maximum frequency	0.00Hz	☆
F01.12	DC braking waiting time for shutdown	0.0s ～ 100.0s	0.0s	☆
F01.13	DC braking current at shutdown	0% ～ 100%	5 0%	☆
F01.14	DC braking time at shutdown	0.0s ～ 100.0s	0.0s	☆
F01.15	Braking rate	0% ～ 100%	100%	☆
F01.16～F01.20	reserve	—	0	☆
F01.21	Speed tracking delay	0.00 ～ 5.00s	0.50s	☆

F02 Group Auxiliary Functions				
Function code	Name	Predetermined area	Factory default	Change
F02.00	Jog operation frequency	0.00Hz ~ Maximum frequency	2.00Hz	☆
F02.01	Jog acceleration time	0.0s ～ 6500.0s	20.0s	☆
F02.02	Jog deceleration time	0.0s ～ 6500.0s	20.0s	☆
F02.03	Acceleration time 2	0.0s ～ 6500.0s	Model confirmation	☆
F02.04	Deceleration time 2	0.0s ～ 6500.0s	Model confirmation	☆
F02.05	Acceleration time 3	0.0s ～ 6500.0s	Model confirmation	☆
F02.06	Deceleration time 3	0.0s ～ 6500.0s	Model confirmation	☆
F02.07	Acceleration time 4	0.0s ～ 6500.0s	Model confirmation	☆
F02.08	Deceleration time 4	0.0s ～ 6500.0s	Model confirmation	☆
F02.09	Hop frequency 1	0.00Hz ~ Maximum frequency	0.00Hz	☆
F02.10	Hop frequency 2	0.00Hz ~ Maximum frequency	0.00Hz	☆
F02.11	Jump frequency amplitude	0.00Hz ~ Maximum frequency	0.01Hz	☆
F02.12	Forward and reverse dead time	0.0s ～ 3000.0s	0.0s	☆
F02.13	Reverse frequency prohibition	0: Invalid 1: Valid	0	☆
F02.14	The set frequency is lower than the lower limit frequency operation mode	0: Run at the lower frequency limit 1: Stop 2: Run at zero speed	0	☆
F02.15	Droop control	0.00Hz ～ 10.00Hz	0.00Hz	☆
F02.16	Set the cumulative power-on arrival time	0h ～ 65000h	0h	☆
F02.17	Set the cumulative running arrival time	0h ～ 65000h	0h	☆

F02.18	Start protection selection	0: No protection 1: Protection Note: When F02.18=0, the terminal power-on detection run command is valid; when F02.18=1, the terminal power-on detection run command is invalid.	0	☆
F02.19	Frequency detection value (FDT1)	0.00Hz ~ Maximum frequency	50.00Hz	☆
F02.20	Frequency detection hysteresis value (FDT1)	0.0% to 100.0% (FDT1 level)	5.0%	☆
F02.21	Frequency arrival (FAR) detection width	0.0% ~ 100.0% (maximum frequency)	0.0%	☆
F02.22	Is the jump frequency valid during acceleration and deceleration?	0: Invalid 1: Valid	0	☆
F02.23	Switching frequency point between acceleration time 1 and acceleration time 2	0.00Hz ~ Maximum frequency	0.00Hz	☆
F02.24	Switching frequency point between deceleration time 1 and deceleration time 2	0.00Hz ~ Maximum frequency	0.00Hz	☆
F02.25	Terminal jog priority	0: Invalid 1: Valid	0	☆
F02.26	Frequency detection value (FDT2)	0.00Hz ~ Maximum frequency	50.00Hz	☆
F02.27	Frequency detection hysteresis value (FDT2)	0.0% to 100.0% (FDT2 level)	5.0%	☆
F02.28	Arbitrary frequency detection value 1	0.00Hz ~ Maximum frequency	50.00Hz	☆
F02.29	Any frequency detection width 1	0.0% ~ 100.0% (maximum frequency)	0.0%	☆
F02.30	Arbitrary arrival frequency detection value 2	0.00Hz ~ Maximum frequency	50.00Hz	☆
F02.31	Frequency detection width 2	0.0% ~ 100.0% (maximum frequency)	0	☆
F02.32	Zero current detection level	0.0% ~ 300.0% 100.0% corresponds to the rated current of the motor	5.0%	☆
F02.33	Zero current detection delay time	0.01s ～ 600.00s	0.10s	☆

F02.34	Output current exceeds limit	0.0% (not detected) 0.1% to 300.0% (rated motor current)	200.0%	☆
F02.35	Output current over-limit detection delay time	0.00s ～ 600.00s	0.00s	☆
F02.36	Arbitrary current 1	0.0% ~ 300.0% (motor rated current)	100.0%	☆
F02.37	Arbitrary current 1 width	0.0% ~ 300.0% (motor rated current)	0.0%	☆
F02.38	Arbitrary current 2	0.0% ~ 300.0% (motor rated current)	100.0%	☆
F02.39	Arbitrary current 2 width	0.0% ~ 300.0% (motor rated current)	0.0%	☆
F02.40	Timing function selection	0: Invalid 1: Valid	0	☆
F02.41	Scheduled running time selection	0: F02.42 setting 1: AI12: AI23: Panel potentiometer Note: The analog input range corresponds to F02.42	0	☆
F02.42	Scheduled running time	0.0Min ～ 6500.0Min	0.0Min	☆
F02.43	AI1 input voltage protection value lower limit	0.00V ～ F02.44	3.10V	☆
F02.44	AI1 input voltage protection value upper limit	F02.43 ～ 1 1.00V	6.80V	☆
F02.45	Module temperature reaches	0℃～ 100℃	75℃	☆
F02.46	Cooling fan control	0: Fan runs during operation 1: Fan runs all the time	0	☆
F02.47	Wake-up frequency	Sleep frequency (F02.49) ~ maximum frequency (F00.10)	0.00Hz	☆
F02.48	Wake-up delay time	0.0s ～ 6500.0s	0.0s	☆
F02.49	Sleep frequency	0.00Hz ~ wake-up frequency (F02.47)	0.00Hz	☆
F02.50	Sleep delay time	0.0s ～ 6500.0s	0.0s	☆
F02.51	Arrival time setting for this run	0.0 to 6500.0 minutes	0.0Min	☆
F02.52	Output power correction factor	0.00% ～ 200.0%	100.0%	☆
F03 Group Motor Parameters				
Function code	Name	Predetermined area	Factory default	Change
F03.00	Motor Type Selection	0: Ordinary asynchronous motor 1: Variable frequency	0	★

		asynchronous motor		
F03.01	Motor rated power	0.1kW ～ 1000.0kW	Model confirmation	★
F03.02	Motor rated voltage	1V ～ 2000V	Model confirmation	★
F03.03	Motor rated current	0.01A ~ 655.35A (Inverter power <= 55kW) 0.1A ~ 6553.5A (Inverter power > 55kW)	Model confirmation	★
F03.04	Motor rated frequency	0.01Hz ~ Maximum frequency	Model confirmation	★
F03.05	Motor rated speed	1rpm～65535rpm	Model confirmation	★
F03.06	Stator resistance of asynchronous motor	0.001 Ω to 65.535 Ω (Inverter power <= 55kW) 0.0001 Ω to 6.5535 Ω (Inverter power > 55kW)	Tuning parameters	★
F03.07	Asynchronous motor rotor resistance	0.001 Ω to 65.535 Ω (Inverter power <= 55kW) 0.0001 Ω to 6.5535 Ω (Inverter power > 55kW)	Tuning parameters	★
F03.08	Leakage inductance of asynchronous motor	0.01mH ~ 655.35mH (inverter power <= 55kW) 0.001mH ~ 65.535mH (inverter power > 55kW)	Tuning parameters	★
F03.09	Asynchronous motor mutual inductance	0.1mH ～ 6553.5mH (inverter power <= 55kW) 0.01mH ～ 655.35mH (inverter power > 55kW)	Tuning parameters	★
F03.10	Asynchronous motor no-load current	0.01A to F03.03 (inverter power <= 55kW) 0.1A to F03.03 (inverter power > 55kW)	Tuning parameters	★
F03.11 ～F03.36	reserve	—	0	★
F03.27	Tuning selection	0: No operation 1: Asynchronous motor static tuning 2: Asynchronous motor complete tuning 3: Static complete parameter identification	0	★
F04 Motor vector control parameters				

Function code	Name	Predetermined area	Factory default	Change
F04.00	Speed loop proportional gain 1	1 ～ 100	30	☆
F04.01	Speed loop integral time 1	0.01s ～ 10.00s	0.50s	☆
F04.02	Switching frequency 1	0.00 ～ F04.05	5.00Hz	☆
F04.03	Speed loop proportional gain 2	1 ～ 100	20	☆
F04.04	Speed loop integral time 2	0.01s ～ 10.00s	1.00s	☆
F04.05	Switching frequency 2	F04.02 ~ Maximum frequency	10.00Hz	☆
F04.06	Vector control slip gain	50% ～ 200%	100%	☆
F04.07	Speed loop filter time constant	0.000s ～ 0.100s	0.015s	☆
F04.08	Vector control overexcitation gain	0 ～ 200	64	☆
F04.09	Torque upper limit source in speed control mode	0: Function code F04.10 setting 1: AI1 2: AI2 3: Panel potentiometer 4: PULSE setting 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2) The full range of 1-7 options corresponds to F04.10	0	☆
F04.10	Digital setting of torque upper limit in speed control mode	0.0% ～ 200.0%	1 6 0.0%	☆
F04.13	Excitation regulation proportional gain	0 ～ 60000	2000	☆
F04.14	Excitation regulation integral gain	0 ～ 60000	1300	☆
F04.15	Torque regulation proportional gain	0 ～ 60000	2000	☆
F04.16	Torque regulation integral gain	0 ～ 60000	1300	☆
F04.17	Speed loop integral separation	0: Invalid 1: Valid	0	☆
F04.18 ～F04.20	reserve	—	0	☆

F05 group torque control parameters

Function code	Name	Predetermined area	Factory default	Change
F05.00	Speed/torque control mode selection	0: Speed control 1: Torque control	0	★

F05.01	Torque setting source selection in torque control mode	0: Digital setting 1 (F05.03) 1: AI1 2: AI2 3: Panel potentiometer 4: PULSE 5: Communication setting 6: MIN (AI1, AI2) 7: MAX (AI1, AI2) (Full scale of options 1-7, corresponding to F05.03 digital setting)	0	★
F05.03	Digital setting of torque in torque control mode	—200.0% ～ 200.0%	150.0%	☆
F05.05	Torque control forward maximum frequency	0.00Hz ~ Maximum frequency	50.00Hz	☆
F05.06	Torque control reverse maximum frequency	0.00Hz ~ Maximum frequency	50.00Hz	☆
F05.07	Torque control acceleration time	0.00s ～ 650.00s	0.00s	☆
F05.08	Torque control deceleration time	0.00s ～ 650.00s	0.00s	☆
F06 Group V/F Control Parameters				
Function code	Name	Predetermined area	Factory default	Change
F06.00	VF curve 3 setting	0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: 1.2th power V/F 4: 1.4th power V/F 5: Reserved 6: 1.6th power V/F 7: Reserved 8: 1.8th power V/F 9: Reserved 10: VF complete separation mode 11: VF semi-separation mode	0	★
F06.01	Torque boost	0.0%: (Automatic torque boost) 0.1% to 30.0%	Model confirmation	☆
F06.02	Torque boost cut-off frequency	0.00Hz ~ Maximum frequency	50.00Hz	★
F06.03	Multi-point VF frequency point F1	0.00Hz ～ F06.05	0.00Hz	★
F06.04	Multi-point VF voltage point V1	0.0% ～ 100.0%	0.0%	★
F06.05	Multi-point VF frequency point F2	F06.03 to F06.07	0.00Hz	★
F06.06	Multi-point VF voltage point V2	0.0% ～ 100.0%	0.0%	★

F06.07	Multi-point VF frequency point F3	F06.05 ~ Motor rated frequency (F03.04)	0.00Hz	★
F06.08	Multi-point VF voltage point V3	0.0% ～ 100.0%	0.0%	★
F06.09	VF slip compensation gain	0.0% ～ 200.0%	0.0%	☆
F06.10	VF overexcitation gain	0 ～ 200	64	☆
F06.11	VF oscillation suppression gain	0 ～ 100	Model confirmatio n	☆
F06.13	VF separated voltage source	0: Digital setting (F06.14) 1: AI1 2: AI2 3: Panel potentiometer 4: PULSE setting (X7) 5: Multi-segment command 6: Simple PLC 7: PID 8: Communication setting Note: 100.0% corresponds to the rated voltage of the motor	0	☆
F06.14	Digital setting of voltage for VF separation	0V ~ Motor rated voltage	0V	☆
F06.15	Voltage acceleration time for VF separation	0.0s ~ 1000.0s Note: It indicates the time from 0V to the rated voltage of the motor.	0.0s	☆
F06.16	Voltage deceleration time for VF separation	0.0s ~ 1000.0s Note: It indicates the time from 0V to the rated voltage of the motor.	0.0s	☆
F06.17	VF separation shutdown mode selection	0: Frequency/voltage are reduced to 0 independently 1: After the voltage is reduced to 0, the frequency is reduced again	0	☆
F06.18	VF over-current stall action current	50～ 200%	150%	☆
F06.19	VF overcurrent stall enable	0: Invalid 1: Valid	1	☆
F06.20	VF overcurrent stall suppression gain	0～ 100	20	
F06.21	VF speed-up over-current stall current compensation coefficient	50～ 200%	50%	☆
F06.22	VF overvoltage stall action voltage	200.0～ 2000.0	760.0	☆

F06.23	VF overvoltage stall enable	0: Invalid 1: Valid	1	☆
F06.24	VF overvoltage stall suppression frequency gain	0～100	30	☆
F06.25	VF overvoltage stall suppression voltage gain	0～100	30	☆
F06.26	Overvoltage stall maximum rising limit frequency	0～ 50Hz	5 Hz	☆
F07 group input terminals				
Function code	Name	Predetermined area	Factory default	Change
F07.00	X1 terminal function selection	0: No function 1: Forward operation FWD or operation command 2: Reverse operation REV or forward and reverse operation direction (Note: When set to 1 or 2, it must be used in conjunction with F07.11, see the function code parameter description for details) 3: Three-wire operation control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Free stop 9: Fault reset (RESET) 10: Operation pause 11: External fault normally open input 12: Multi-segment command terminal 1 13: Multi-segment command terminal 2 14: Multi-segment command terminal 3 15: Multi-segment command terminal 4 16: Acceleration and deceleration time selection terminal 1 17: Acceleration and deceleration time selection terminal 2 18: Frequency source switch 19: UP/DOWN Setting clear (terminal, keyboard) 20: Control command switching terminal 1 21: Acceleration and deceleration prohibited 22: PID pause 23: PLC status	1	★
F07.01	X2 terminal function selection		2	★
F07.02	X3 terminal function selection		9	★
F07.03	X4 terminal function selection		12	★

F07.04	X5 terminal function selection	reset 24: Swing frequency pause 25: Counter input 26: Counter reset 27: Length count input 28: Length reset 29: Torque control prohibited 30: PULSE frequency input (valid only for X7) 31: Reserved 32: Immediate DC braking 33: External fault normally closed input 34: Frequency modification enable 35: PID action direction reverse 36: External stop terminal 1 37: Control command switching terminal 2 38: PID integral pause 39: Frequency source A and preset frequency switch 40: Frequency source B and preset frequency switch 41: Reserved 42: Reserved 43: PID parameter switch 44: User-defined fault 1 45: User-defined fault 2 46: Speed control / torque control switch 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC brake 50: This running time is cleared 51: Two-wire / three-wire switch 52: Reverse prohibition 53: Start / stop 54: Run permission 55: Interlock 1 56: Interlock 2 57: Interlock 3 58: PFC start / stop	13	★
F07.05	X6 terminal function selection		0	★
F07.06	X7 terminal function selection		30	★
F07.07	reserve		0	★
F07.08	reserve		0	★
F07.09	reserve		0	★
F07.10	X filter time	0.000s ～ 1.000s	0.010s	☆
F07.11	Terminal command mode	0: Two-wire 1 1: Two-wire 2 2: Three-wire 1 3: Three-wire 2	0	★
F07.12	Terminal UP/DOWN change rate	0.001Hz/s ～ 65.535Hz/s	1.00Hz/s	☆
F07.13	AI curve 1 minimum input	0.00V ～ F07.15	0.00V	☆
F07.14	AI curve 1 minimum input corresponding setting	-100.0% ～ +100.0%	0.0%	☆
F07.15	AI curve 1 maximum input	F07.13 ～ +10.00V	10.00V	☆
F07.16	AI curve 1 maximum input corresponding	—100.0% ～ + 150.0 %	100.0%	☆

	setting			
F07.17	AI1 filter time	0.00s ～ 10.00s	0.10s	☆
F07.18	AI curve 2 minimum input	0.00V ～ F07.20	0.00V	☆
F07.19	AI curve 2 minimum input corresponding setting	—100.0% ～ +1 0 0.0%	0.0%	☆
F07.20	AI curve 2 maximum input	F07.18 ～ +10.00V	10.00V	☆
F07.21	AI curve 2 maximum input corresponding setting	—100.0% ～ + 150.0 %	100.0%	☆
F07.22	AI2 filter time	0.00s ～ 10.00s	0.10s	☆
F07.23	Panel potentiometer minimum input	—10.00V ～ F07.25	-9.50V	☆
F07.24	Panel potentiometer minimum input corresponding setting	-100.0% ～ +100.0%	0.0%	☆
F07.25	Panel potentiometer maximum input	F07.23 ～ +10.00V	9.50V	☆
F07.26	Panel potentiometer maximum input corresponding setting	—100.0% ～ + 150.0 %	100.0%	☆
F07.27	Panel potentiometer filter time	0.00s ～ 10.00s	0.10s	☆
F07.28	PULSE minimum input	0.00kHz～F07.30	0.00kHz	☆
F07.29	PULSE minimum input corresponding setting	—100.0% ～ 100.0%	0.0%	☆
F07.30	PULSE maximum input	F07.28 ～ 100.00kHz	50.00kHz	☆
F07.31	PULSE maximum input setting	—100.0% ～ 100.0%	100.0%	☆
F07.32	PULSE filter time	0.00s ～ 10.00s	0.10s	☆
F07.33	AI curve selection	Units: AI1 curve selection 1: Curve 1 (2 points, see F07.13 ~ F07.16) 2: Curve 2 (2 points, see F07.18 ~ F07.21) 3: Reserved 4: Curve 4 (4 points, see F18.00 ~ F18.07) 5: Curve 5 (4 points, see F18.08 ~ F18.15) Tens: AI2 curve selection, same as above Hundreds: Reserved	321	☆

F07.34	AI below minimum input setting selection	Units: AI1 is lower than the minimum input setting selection 0: Corresponding minimum input setting 1: 0.0% Tens: AI2 is lower than the minimum input setting selection, same as above Hundreds: Panel potentiometer is lower than the minimum input setting selection, same as above	OOO	☆
F07.35	X1 Delay Time	0.0s ～ 3600.0s	0.0s	★
F07.36	X2 Delay Time	0.0s ～ 3600.0s	0.0s	★
F07.37	X3 Delay Time	0.0s ～ 3600.0s	0.0s	★
F07.38	X terminal effective mode selection 1	0: Low level is valid 1: High level is valid Units: X1 Tens: X2 Hundreds: X3 Thousands: X4 Tens of thousands: X5	00000	★
F07.39	X terminal effective mode selection 2	0: Low level is valid 1: High level is valid Units: X6 Tens: X7 Hundreds: Reserved Thousands: Reserved Tens of thousands: Reserved	00000	★
F07.40	AI1 input signal selection	0: voltage signal 1: current signal	0	★
F07. 41	AI1 input anti-shake coefficient	0 ～ 1000	0	☆
F07.4 2	AI 2 input anti-shake coefficient	0 ～ 1000	0	☆
F08 group output terminal				
Function code	Name	Predetermined area	Factory default	Change
F08.00	DO terminal output mode selection	0: Pulse output (DOP) 1: Switching output (DOR) Note: DOP and DOR are both output through the main control board terminal DO.	0	☆
F08.01	DOR output function selection	0: No output	0	☆

F08.02	Control board relay R1 function selection	1: Inverter running 2: Fault output (fault for free stop) 3: Frequency level detection FDT1 output 4: Frequency arrival signal (FAR) 5: Zero speed running (no output when stopped) 6: Motor overload pre-alarm 7: Inverter overload pre-alarm 8: Set count value reached 9: Specified count value reached 10: Length reached 11: PLC cycle completed 12: Accumulated running time reached 13: Frequency limited 14: Torque limited 15: Ready for operation 16: AI1>AI2 17: Upper limit frequency reached 18: Lower limit frequency reached (operation related) 19: Undervoltage status output 20: Communication setting 21: Reserved 22: Reserved 23: Zero speed running 2 (also output when stopped) 24: Accumulated power-on time reached 25: Frequency level detection FDT2 output 26: Frequency 1 reached output 27: Frequency 2 reached output 28: Current 1 reached output 29: Current 2 Arrival output 30: Timing arrival output 31: AI1 input exceeds limit 32: Load loss 33: Reverse operation 34: Zero current state 35: Module temperature reaches 36: Output current exceeds limit 37: Lower frequency reaches (output also during shutdown) 38: Warning output (all faults) 39: Motor overtemperature pre-alarm 40: This running time reaches 41: Fault output (free shutdown fault and no output for undervoltage) 42: Interlock 1 output 43: Interlock 2 output 44: Interlock 3 output	2	☆
F08.03	Control board relay R2 output function selection		0	☆
F08.04	Open collector Y1 output function selection		1	☆
F08.05	reserve		0	☆

F08.06	DOP output function selection	0: Operation frequency 1: Set frequency 2: Output current (2 times the rated current of the motor) 3: Output torque (2 times the rated torque of the motor) 4: Output power (2 times the rated power) 5: Output voltage (1.2 times the rated voltage of the inverter) 6: PULSE input (100.0% for 100.0kHz) 7: AI1 8: AI2 9: Reserved 10: Length 11: Count value 12: Communication setting 13: Motor speed 14: Output current (100.0% corresponds to 1000.0A 15: Output voltage (100.0% corresponds to 1000.0V 16: Output torque (actual torque value)	0	☆
F08.07	AO1 output function selection		0	☆
F08.08	AO2 output function selection		1	☆
F08.09	DOP output maximum frequency	0.01KHz ～ 100.00KHz	50.00Hz	☆
F08.10	AO1 zero bias coefficient	-100.0% ～ +100.0%	0.0%	☆
F08.11	AO1 Gain	-10.00 ～ +10.00	1.00	☆
F08.12	AO2 bias coefficient	-100.0% ～ +100.0%	0.0%	☆
F08.13	AO2 Gain	-10.00 ～ +10.00	1.00	☆
F08.14 ～F08.1 6	reserve	—	0	☆
F08.1 7	DOR output delay time	0.0s ～ 3600.0s	0.0s	☆
F08.18	R1 output delay time	0.0s ～ 3600.0s	0.0s	☆
F08.19	R2 output delay time	0.0s ～ 3600.0s	0.0s	☆
F08.20	Y1 output delay time	0.0s ～ 3600.0s	0.0s	☆
F08.21	reserve	—	0	☆
F08.22	Switch output terminal effective state selection	0: Positive logic 1: Negative logic Units: DOR Tens: R1 Hundreds: R2 Thousands: Y1 Ten thousand: Reserved	0000	☆

Function code	Name	Predetermined area	Factory default	Change
F08.23	AO1 output signal selection	0: voltage signal 1: current signal	0	★
F09 Group PID function				
Function code	Name	Predetermined area	Factory default	Change
F09.00	PID given source	0: F09.01 setting 1: AI1 2: AI2 3: Panel potentiometer 4: PULSE setting (X7) 5: Communication setting 6: Multi-segment command setting 7: Pressure setting (MPa, Kg)	0	☆
F09.01	PID value given	0.0% ～ 100.0%	50.0%	☆
F09.02	PID feedback source	0: AI1 1: AI2 2: Reserved 3: AI1-AI2 4: PULSE setting (X7) 5: Communication setting 6: AI1+AI2 7: MAX(|AI1|, |AI2|) 8: MIN(|AI1|, |AI2|)	0	☆
F09.03	PID action direction	0: Positive effect 1: Negative effect	0	☆
F09.04	PID given feedback range	0 ~ 65535	1000	☆
F09.05	Proportional gain Kp1	0.0 ～ 999.9	20.O	☆
F09.06	Integration time Ti1	0.01s ～ 10.00s	2.00s	☆
F09.07	Derivative time Td1	0.000s ～ 10.000s	0.000s	☆
F09.08	PID reverse cut-off frequency	0.00 ~ Maximum frequency	2.00Hz	☆
F09.09	PID deviation limit	0.0% ～ 100.0%	0.0%	☆
F09.10	PID differential limiting	0.00% ～ 100.00%	0.5 0 %	☆
F09.11	PID given change time	0.00 ～ 650.00s	0.00s	☆
F09.12	PID feedback filter time	0.00 ～ 60.00s	0.00s	☆
F09.13	PID output filter time	0.0 ～ 60 0.0s	10 0.0s	☆
F09.14	reserve	-	-	☆
F09.15	Proportional gain Kp2	0.0 ～ 999.9	20.0	☆
F09.16	Integration time Ti2	0.01s ～ 10.00s	2.00s	☆
F09.17	Derivative time Td2	0.000s ～ 10.000s	0.000s	☆

F09.18	PID parameter switching conditions	0: No switching 1: Switching via X terminal 2: Automatic switching based on deviation 3 to 8: Reserved	0	☆
F09.19	PID parameter switching deviation 1	0.0% ～ F09.20	20.0%	☆
F09.20	PID parameter switching deviation 2	F09.19 ～ 100.0%	80.0%	☆
F09.21	PID initial value	0.0% ～ 100.0%	0.0%	☆
F09.22	PID initial value holding time	0.00 ～ 650.00s	0.00s	☆
F09.23～F09.24	reserve	—	0	☆
F09.25	PID feedback upper limit loss detection value	0.0%: Do not judge feedback loss 0.1% ~ 100.0%	0.0%	☆
F09.26	PID feedback lower limit loss detection value		0.0%	☆
F09.27	PID feedback loss detection time	0.0s ～ 20.0s	0.0s	☆
F09.28	PID shutdown calculation	0: No calculation when stopped 1: Calculation when stopped	0	☆
F10 group multi-segment instructions, simple PLC				
Function code	Name	Predetermined area	Factory default	Change
F10.00	Multi-segment instruction 0	-100.0% ～ 100.0%	0.0%	☆
F/10.01	Multi-segment instruction 1	-100.0% ～ 100.0%	0.0%	☆
F/10.02	Multi-segment instruction 2	-100.0% ～ 100.0%	0.0%	☆
F/10.03	Multi-segment instruction 3	-100.0% ～ 100.0%	0.0%	☆
F/10.04	Multi-segment instruction 4	-100.0% ～ 100.0%	0.0%	☆
F/10.05	Multi-segment instruction 5	-100.0% ～ 100.0%	0.0%	☆
F/10.06	Multi-segment instruction 6	-100.0% ～ 100.0%	0.0%	☆
F/10.07	Multi-segment instruction 7	-100.0% ～ 100.0%	0.0%	☆
F/10.08	Multi-segment instruction 8	-100.0% ～ 100.0%	0.0%	☆
F/10.09	Multi-segment instruction 9	-100.0% ～ 100.0%	0.0%	☆
F/10.10	Multi-segment	-100.0% ～ 100.0%	0.0%	☆

	instruction 10			
F/10.11	Multi-segment instruction 11	-100.0% ～ 100.0%	0.0%	☆
F/10.12	Multi-segment instruction 12	-100.0% ～ 100.0%	0.0%	☆
F/10.13	Multi-segment instruction 13	-100.0% ～ 100.0%	0.0%	☆
F/10.14	Multi-segment instruction 14	-100.0% ～ 100.0%	0.0%	☆
F/10.15	Multi-segment instruction 15	-100.0% ～ 100.0%	0.0%	☆
F/10.16	Simple PLC operation mode	0: Stop at the end of a single run 1: Keep the final value at the end of a single run 2: Keep looping	0	☆
F/10.17	Simple PLC power-off memory selection	Units: Power-off memory selection 0: No memory after power-off 1: Memory after power-off Tens: Stop memory selection 0: No memory after stop 1: Memory after stop	OO	☆
F/10.18	Simple PLC 0th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.19	Simple PLC 0th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.20	Simple PLC first stage running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.21	Simple PLC first stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.22	Simple PLC second stage running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.23	Simple PLC 2nd stage acceleration/deceleration time selection	0 to 3	0	☆
F/10.24	Simple PLC 3rd stage running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.25	Simple PLC 3rd stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.26	Simple PLC 4th stage running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆

F/10.27	Simple PLC 4th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.28	Simple PLC 5th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.29	Simple PLC 5th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.30	Simple PLC 6th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.31	Simple PLC 6th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.32	Simple PLC 7th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.33	Simple PLC 7th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.34	Simple PLC 8th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.35	Simple PLC 8th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.36	Simple PLC 9th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.37	Simple PLC 9th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.38	Simple PLC 10th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.39	Simple PLC 10th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.40	Simple PLC 11th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆

F/10.41	Simple PLC 11th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.42	Simple PLC 12th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.43	Simple PLC 12th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.44	Simple PLC 13th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.45	Simple PLC 13th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.46	Simple PLC 14th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.47	Simple PLC 14th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.48	Simple PLC 15th segment running time	0.0s(h) ～ 6500.0s(h)	0.0s(h)	☆
F/10.49	Simple PLC 15th stage acceleration and deceleration time selection	0 to 3	0	☆
F/10.50	Simple PLC running time unit	0: s (seconds) 1: h (hours)	0	☆
F/10.51	Multi-segment instruction 0 setting mode	0: Function code F10.00 given 1: AI1 2: AI2 3: Panel potentiometer 4: PULSE 5: PID 6: Preset frequency (F00.08) given, UP/DOWN can be modified	0	☆
F11 group swing frequency, fixed length and counting				
Function code	Name	Predetermined area	Factory default	Change
F11.00	Frequency setting method	0: relative to center frequency 1: relative to maximum frequency	0	☆
F/11.01	Swing frequency	0.0% ～ 100.0%	0.0%	☆
F/11.02	Jump frequency	0.0% ～ 50.0%	0.0%	☆

	amplitude			
F/11.03	Swing frequency cycle	0.1s ～ 3000.0s	10.0s	☆
F/11.04	The rise time of the triangle wave of the swing frequency	0.1% ～ 100.0%	50.0%	☆
F/11.05	Set length	0m ～ 65535m	1000m	☆
F/11.06	Actual length	0m ～ 65535m	0m	☆
F/11.07	Pulses per meter	0.1 ～ 6553.5	100.O	☆
F/11.08	Set the count value	1 ~ 65535	1000	☆
F/11.09	Specifying count value	1 ~ 65535	1000	☆
F11.10～F11.14	reserve	—	0	☆
F12 Group Fault and Protection				
Function code	Name	Predetermined area	Factory default	Change
F12.00	Motor overload protection selection	0: Prohibit 1: Allow	1	☆
F/12.01	Motor overload protection gain	0.01 ～ 10.00	0.20	☆
F/12.02	Motor overload warning factor	50% ～ 100%	80%	☆
F/12.03	Overvoltage stall gain	0 ～ 100	0	☆
F/12.04	Overvoltage stall protection voltage	200.0～ 2000.0	760.0	☆
F/12.05	Overcurrent stall gain	0 ～ 100	20	☆
F/12.06	Over-current stall protection current	100% ～ 200%	1 1 0%	☆
F/12.07	reserve	—	0	☆
F/12.08	Braking start voltage	200.0～ 2000.0V	690.0V	☆
F/12.09	Fault automatic reset times	0 ～ 200	0	☆
F/12.10	terminal output action selection during fault automatic reset	0: No action 1: Action	1	☆
F/12.11	Fault automatic reset interval	0.1s ～ 100.0s	6.0s	☆
F/12.12	Input phase loss protection selection	0: Disable (inverter power <= 11kW) 1: Allowed (inverter power > 11kW)	Model confirmation	☆

F/12.13	Output phase loss protection selection	0: Prohibit 1: Allow	1	☆
F/12.14	First failure type	0: No fault 1: Reserved 2: Acceleration overcurrent 3: Deceleration overcurrent 4: Constant speed overcurrent 5: Acceleration overvoltage 6: Deceleration overvoltage 7: Constant speed overvoltage 8: Buffer resistor overload 9: Undervoltage 10: Inverter overload 11: Motor overload 12: Input phase loss 13: Output phase loss 14: Module overheating 15: External fault 16: Communication abnormality 17: Reserved 18: Current detection abnormality 19: Motor tuning abnormality 20: Reserved 21: Parameter read and write abnormality 22: Inverter hardware abnormality 23: Reserved 24: Reserved 25: Reserved 26: Running time reached 27: Reserved 28: Reserved 29: Power-on time reached 30: Load loss 31: PID feedback lost during operation 40: Fast current limit timeout 41: Switch motor during operation 42: Speed deviation is too large 43: Motor overspeed 45: Motor overtemperature 51: Initial position error	-	●
F/12.15	Second fault type		-	●
F/12.16	The third (most recent) fault type		-	●
F/12.17	The third (most recent) fault frequency	-	-	●
F/12.18	Current at the third (most recent) fault	-	-	●
F/12.19	Bus voltage at the third (most recent) fault	-	-	●
F/12.20	Input terminal status at the third (most recent) fault	-	-	●
F/12.21	Output terminal status at the third (most recent) fault	-	-	●

F/12.22	The inverter status at the third (most recent) fault	-	-	●
F/12.23	Power-on time at the third (most recent) fault	-	-	●
F/12.24	Running time at the third (most recent) failure	-	-	●
F/12.27	Second fault frequency	-	-	●
F/12.28	Second fault current	-	-	●
F/12.29	Bus voltage at the second fault	-	-	●
F/12.30	Input terminal for the second fault	-	-	●
F/12.31	Output terminal at the second fault	-	-	●
F/12.32	Inverter status at the second fault	-	-	●
F/12.33	Power-on time at the second fault	-	-	●
F/12.34	Second fault running time	-	-	●
F/12. 35	Inverter overload protection gain	0.01 ～ 10.00	1. 00	☆
F/12.3 6	Undervoltage fault reset time during operation	0.0s ～ 65 53.s	0.0s	☆
F/12.37	First failure frequency	-	-	●
F/12.38	First fault current	-	-	●
F/12.39	Bus voltage at the first fault	-	-	●
F/12.40	Input terminal at first fault	-	-	●
F/12.41	Output terminal status at the first fault	-	-	●
F/12.42	Inverter status at the first fault	-	-	●
F/12.43	Power-on time at first fault	-	-	●
F/12.44	First failure running time	-	-	●
F/12.4 6	Power failure restart setting	Units: Power-off restart selection 0: Invalid 1: Valid Tens: Undervoltage restart selection 0: Invalid 1: Valid Hundreds: Reserved	00	☆

		Thousands: Reserved Tens of thousands: Reserved		
F/12.47	Fault protection action selection 1	Units: Motor overload (11) 0: Free stop 1: Stop according to the stop mode 2: Continue to run Tens: Input phase loss (12) Hundreds: Output phase loss (13) Thousands: External fault (15) Tens of thousands: Communication abnormality (16)	OOOOO	☆
F/12.48	Fault protection action selection 2	Units: Reserved 0: Free stop Tens: Function code read/write abnormality (21) 0: Free stop 1: Stop according to the stop mode Hundreds: Reserved Thousands: Motor overheating (25) Tens of thousands: Running time reached (26)	OOOOO	☆
F/12.49	Fault protection action selection 3	Units: User-defined fault 1 (27) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Tens: User-defined fault 2 (28) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Hundreds: Power-on time reached (29) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run Thousands: Load loss (30) 0: Coast to stop 1: Decelerate to stop 2: Jump directly to 7% of the rated frequency of the motor and continue to run. If there is no load loss, it will automatically return to the set frequency and run Tens of thousands: PID feedback loss during operation (31) 0: Coast to stop 1: Stop according to the stop mode 2: Continue to run	OOOOO	☆
F/12.50	Fault protection action selection 4	Units: Speed deviation is too large (42) 0: Free stop 1: Stop according to the stop mode 2: Continue to run Tens, hundreds, thousands, and ten thousand:	OOOOO	☆

		Reserved		
F/12.54	Continue to run frequency selection when fault occurs	0: Run at the current operating frequency 1: Run at the set frequency 2: Run at the upper limit frequency 3: Run at the lower limit frequency 4: Run at the abnormal backup frequency	0	☆
F/12.55	Abnormal backup frequency	0.0% ~ 100.0% (100.0% corresponds to the maximum frequency F00.10)	100.0%	☆
F/12.56	Motor temperature sensor type	0: No temperature sensor 1: PT100 2: PT1000	0	☆
F/12.57	Motor overheat protection threshold	0℃～ 200℃	110℃	☆
F/12.58	Motor overheat warning threshold	0℃～ 200℃	90℃	☆
F/12.59	Instantaneous power failure action selection	0: Invalid 1: Deceleration 2: Deceleration stop	0	☆
F/12.60	Momentary stop action pause judgment voltage	80.0% ～ 100.0%	85.0 %	☆
F/12.61	Instantaneous power outage voltage recovery judgment time	0.00s ～ 100.00s	0.50s	☆
F/12.62	Instantaneous power failure action judgment voltage	60.0% ~ 100.0% (standard bus voltage)	80.0%	☆
F/12.63	Load drop protection option	0: Invalid 1: Valid	0	☆
F/12.64	Load drop detection level	0.0～100.0%	10.0%	☆
F/12.65	Load drop detection time	0.0～60.0s	1.0s	☆
F/12.66	reserve	—	0	☆
F/12.67	reserve	—	0	☆
F/12.68	SVC speed deviation too large detection value	0.0%～50.0% (maximum frequency)	20.0%	☆
F/12.69	SVC speed deviation excessive detection time	0.0s: No detection 0.1 ~ 60.0s	0 .0s	☆
F/12.70	Instantaneous power	0 ～ 100	40	☆

	failure without stopping gain K p			
F/12.71	Instantaneous power failure integral coefficient Ki	0 ～ 100	30	☆
F12.72	Momentary stop and non-stop action deceleration time	0.0 ～ 300.0s	20.0s	☆
F12.7 3	Carrier automatic adjustment selection	Units: Automatic adjustment of overload carrier 0: Disable 1: Valid Tens: Automatic adjustment of carrier at start-up 0: Disable 1: Valid Hundreds, thousands, and ten thousand: reserved	11	☆
F13 Group communication parameters				
Function code	Name	Predetermined area	Factory default	Change
F13.00	MODBUS communication baud rate	0～1: Reserved 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	6	☆
F/13.01	MODBUS Data Format	0: No check (8-N-2) 1: Even check (8-E-1) 2: Odd check (8-O-1) 3: No check (8-N-1)	1	☆
F/13.02	Local address	1 ~ 247	1	☆
F/13.03	MODBUS reply delay	0～20ms	2	☆
F/13.04	RS485 communication timeout	0.0: Invalid 0.1 ~ 60.0s	0.0s	☆
F/13.05	MODBU protocol selection	0: Non-standard MODBUS protocol 1: Standard MODBUS protocol	1	☆
F/13.06	RS485 communication read current resolution	0: 0.01A 1: 0.1A	0	☆
F13.0 7	RS485 communication protocol selection	0: SY3000 protocol 1: A900 protocol 2 to 10: Reserved	0	☆
F13.0 8	RS485 communication timeout detection selection	0: valid throughout the whole process 1: invalid during shutdown	0	☆
F14 Group Keyboard and Display				
Function code	Name	Predetermined area	Factory default	Change

F14.00	FUNC key function selection	0: FUNC key invalid 1: Switch between operation panel command channel and remote command channel (terminal command channel or communication command channel) 2: Forward/reverse switch 3: Forward jog 4: Reverse jog Note: When F14.00=1, switch to terminal operation command, the small dot of auxiliary display unit digit flashes slowly at intervals of 1s; switch to communication operation command channel, the small dot of auxiliary display unit digit flashes quickly at intervals of 200ms.	3	★
F/14.01	STOP/RESET key function	0: The STOP/RES key stop function is valid only in keyboard operation mode 1: The STOP/RES key stop function is valid in any operation mode	1	☆
F/14.02	LED operation main display parameters 1	0000 ~ FFFF Bit00: Operating frequency 1 (Hz) Bit01: Set frequency (Hz) Bit02: Bus voltage (V) Bit03: Output voltage (V) Bit04: Output current (A) Bit05: Output power (kW) Bit06: Output torque (%) Bit07: Terminal input status Bit08: Terminal output status Bit09: AI1 voltage (V) Bit10: AI2 voltage (V) Bit11: Pressure feedback (MPa, Kg) Bit12: Count value Bit13: Length value Bit14: Load speed display Bit15: PID setting	1F	☆

F/14.03	LED operation main display parameters 2	0000 ~ FFFF Bit00: PID feedback Bit01: PLC stage Bit02: PULSE input pulse frequency (kHz) Bit03: Operation frequency 2 (Hz) Bit04: Remaining operation time Bit05: AI1 voltage before correction (V) Bit06: AI2 voltage before correction (V) Bit07: Pressure setting (MPa, Kg) Bit08: Line speed Bit09: Current power-on time (Hour) Bit10: Current operation time (Min) Bit11: PULSE input pulse frequency (Hz) Bit12: Communication setting value Bit13: Reserved Bit14: Main frequency A display (Hz) Bit15: Auxiliary frequency B display (Hz)	0	☆
F/14.04	LED shutdown main display parameters	0000 ~ FFFF Bit00: Set frequency (Hz) Bit01: Bus voltage (V) Bit02: Terminal input status Bit03: Terminal output status Bit04: AI1 voltage (V) Bit05: AI2 voltage (V) Bit06: Panel potentiometer voltage (V) Bit07: Count value Bit08: Length value Bit09: PLC stage Bit10: Load speed Bit11: PID setting Bit12: PULSE input pulse frequency (kHz) Bit1 3 : Pressure feedback (MPa, Kg) Bit1 4 : Input voltage (V) Bit1 5 : Reserved	33	☆
F/14.05	LED operation auxiliary display parameters	0 ~ 80	4	☆
F/14.06	LED shutdown auxiliary display parameters	0 ~ 80	38	☆
F/14.07	Load speed display factor	0.0001 ～ 6.5000	1.0000	☆
F/14.08	Inverter module heat sink temperature	0℃～ 100℃	-	●
F/14.09	Cumulative running time	0h ～ 65535h	-	●

F/14.10	Speed display decimal places	LED units: load speed (d00.14) display coefficient 0: 0 decimal places 1: 1 decimal places 2: 2 decimal places 3: 3 decimal places LED tens: feedback speed (d00.19) display coefficient 1: 1 decimal places 2: 2 decimal places	twenty one	☆
F/14.11	Cumulative power-on time	0 to 65535 hours	-	●
F/14.12	Cumulative power consumption	0 ~ 65535 degrees	-	●
F/14.13	Hardware version number	-	-	●
F/14.14	Software version number	-	-	●
F/14.15	Software batch number	-	3.0 410	●

F15 group function code management				
Function code	Name	Predetermined area	Factory default	Change
F15.00	user password	0 ~ 65535	0	☆
F/15.01	Parameter initialization	0: No operation 1: All user parameters except motor parameters are restored to factory settings 2: All user parameters are restored to factory settings 3: Clear record information	0	★
F/15.02	Function code modification properties	0: editable 1: uneditable	0	☆
F/15.03	reserve	—	0	●
F/15.04	reserve	—	0	●

F16 Group Water Supply Parameters				
Function code	Name	Predetermined area	Factory default	Change
F16.00	Terminal connection and disconnection delay	0.0～6000.0s	0.1	☆
F16.01	Polling time	0.0～6000.0h	48.0	☆
F/16.02	Pump reduction lower frequency	0.0～ Upper frequency limit	35.00	☆
F/16.03	Pump delay time	0.0～3600.0s	5.0	☆

F/16.04	Pump reduction delay time	0.0～3600.0s	5.0	☆
F/16.05	Pump sleep waiting time	0.0～3600.0s	2.0	☆
F/16.06	Water pump wake-up waiting time	0.0～3600.0s	1.0	☆
F/16.07	Water pump wake-up pressure point	(0.0～100.0%)*（F16.08）	80.0%	☆
F/16.08	Preset pressure	0.00～F16.09（MPa, Kg）	5.00	☆
F/16.09	Sensor range	0.00～100.00（MPa、Kg）	10.00	☆
F/16.10	Solar panel maximum power node	0.0%～100.0%	81.0	☆
F/16.11	VF speed adjustment coefficient	0.000～2.000	1.000	☆
F/16.12	MPPT high point working voltage	(F16.1 3)～200.0%	100.0%	☆
F/16.13	MPPT low point operating voltage	0.0%～（F16.1 2 ）	75.0%	☆
F/16.14	MPPT high point voltage frequency point	0.00Hz～maximum frequency (F00.10)	50.00	☆
F/16.15	MPPT low point voltage frequency point	0.00Hz～maximum frequency (F00.10)	0.00	☆
F/16.16	MPPT low voltage protection point	40.0 %～ 100.0 %	45.0%	☆
F/16.17	Water shortage detection starting frequency	0.00Hz～maximum frequency (F00.10)	10.00	☆
F/16.18	The ratio of photovoltaic water pump water shortage detection current to no-load current	0.0%～300.0%* no-load current (F03.10)	0.0	☆
F/16.19	Photovoltaic water pump water shortage detection time	0～6000.0s	0.0	☆
F/16.20	Photovoltaic undervoltage self-start delay	0.1～6000.0s (0.0 value turns off automatic start)	2.0	☆
F/16.21	Photovoltaic water shortage self-start delay	0.1～6000.0s (0.0 value turns off automatic start)	15.0	☆
F/16.22	Power search time	0.050～60.000	0.500	☆

F/16.23	Power search gain	10～500	125	☆
F/16.24	Power search speed gain	1～1000	100	☆
F/16.25	Pre-search upsampling time	0.01～600.00s	15.00	☆
F/16.26	Pre-search frequency reduction time	0.01～600.00s	15.00	☆
F17 Group Control Optimization Parameters				
Function code	Name	Predetermined area	Factory default	Change
F17.00	DPWM switching upper limit frequency	0.00Hz ~ maximum frequency (F00.10)	8.00Hz	☆
F/17.01	PWM modulation method	0: Asynchronous modulation 1: Synchronous modulation	0	☆
F/17.02	Dead zone compensation mode selection	0: No compensation 1: Compensation mode	1	☆
F/17.03	Random PWM Depth	0: Random PWM invalid 1~10: PWM carrier frequency random depth	0	☆
F/17.04	Wave-by-wave current limiting enable	0: Disable 1: Enable	1	☆
F/17.05	Voltage overmodulation factor	100～ 110	105	☆
F/17.06	Undervoltage point setting	200.0V ～ 2 0 00.0V	350.0V	☆
F/17.07	reserve	—	0	☆
F/17.08	Overvoltage point setting	200.0V ～ 2200.0V	Model confirmation	★
F/17.09 ～F17.10	reserve	—	0	☆
F18 AI curve setting				
Function code	Name	Predetermined area	Factory default	Change
F18.00	AI curve 4 minimum input	—10.00V ～ F18.02	0.00V	☆
F18.01	AI setting curve 4 minimum input corresponding setting	-100.0% ～ +100.0%	0.0%	☆
F/18.02	AI curve 4 inflection point 1 input	F18.00 to F18.04	3.00V	☆
F/18.03	AI curve 4 inflection	-100.0% ～ +100.0%	30.0%	☆

	point 1 input corresponding setting			
F/18.04	AI curve 4 inflection point 2 input	F18.02 to F18.06	6.00V	☆
F/18.05	AI curve 4 inflection point 2 input corresponding setting	-100.0% ～ +100.0%	60.0%	☆
F/18.06	AI Curve 4 Maximum Input	F18.06 ～ +10.00V	10.00V	☆
F/18.07	AI curve 4 maximum input corresponding setting	-100.0% ～ +100.0%	100.0%	☆
F/18.08	AI Curve 5 Minimum Input	—10.00V ～ F18.10	-10.00V	☆
F/18.09	AI curve 5 minimum input corresponding setting	-100.0% ～ +100.0%	—100.0%	☆
F/18.10	AI curve 5 inflection point 1 input	F18.08 to F18.12	-3.00V	☆
F/18.11	AI curve 5 inflection point 1 input corresponding setting	— 1 00.0% ～ +100.0%	-30.0%	☆
F/18.12	AI Curve 5 Inflection Point 2 Input	F18.10 to F18.14	3.00V	☆
F/18.13	AI curve 5 inflection point 2 input corresponding setting	-100.0% ～ +100.0%	30.0%	☆
F/18.14	AI Curve 5 Maximum Input	F18.12 ～ +10.00V	10.00V	☆
F/18.15	AI curve 5 maximum input corresponding setting	-100.0% ～ +100.0%	100.0%	☆
F18. 16	AI1 sets the jump point	—100.0% ～ 100.0%	0.0%	☆
F18. 17	AI1 sets the jump range	0.0% ～ 100.0%	0.1 %	☆
F18. 18	AI2 set jump point	—100.0% ～ 100.0%	0.0%	☆
F18. 19	AI2 sets the jump range	0.0% ～ 100.0%	0.1 %	☆
F18.2 0	Panel potentiometer setting jump point	—100.0% ～ 100.0%	0.0%	☆
F18.2 1	Panel potentiometer sets the jump amplitude	0.0% ～ 100.0%	0.1 %	☆
FFF group factory parameters				
Function code	Name	Predetermined area	Factory default	Change

FFF.00	Manufacturer password	0 to 65535	0	★

Group d00 Basic monitoring parameters			
Function code	Name	Factory default	Change
d00.00	Operating frequency (Hz)	0.01Hz	7000H
d00.01	Set frequency (Hz)	0.01Hz	7001H
d00.02	Bus voltage (V)	0.1V	7002H
d00.03	Output voltage(V)	1V	7003H
d00.04	Output current(A)	0.01A	7004H
d00.05	Output power (kW)	0.1kW	7005H
d00.06	Output torque(%)	0.10%	7006H
d00.07	Terminal input status	1	7007H
d00.08	Terminal output status	1	7008H
d00.09	AI1 voltage (V)/current (mA)	0.01V/0.01 mA	7009H
d00.10	AI2 voltage (V)	0.01V	700AH
d00.11	Pressure feedback (MPa, Kg)	0.00	700BH
d00.12	Count value	1	700CH
d00.13	Length value	1	700CH
d00.14	Load speed display	1	700EH
d00.15	PID Setting	1	700FH
d00.16	PID Feedback	1	7010H
d00.17	PLC stage	1	7011H
d00.18	PULSE Input pulse frequency (Hz)	0.01kHz	7012H
d00.19	Feedback speed (Hz)	0.01Hz	7013H
d00.20	Remaining running time	0.1Min	7014H
d00.21	AI1 voltage (V)/current (mA) before correction	0.001V/0.01mA	7015H
d00.22	AI2 voltage before correction (V)	0.001V	7016H
d00.23	Pressure setting (MPa, Kg)	0.00	7017H
d00.24	Line speed	1m/Min	7018H
d00.25	Current power-on time	1Min	7019H
d00.26	Current running time	0.1Min	701AH
d00.27	PULSE Input pulse frequency	1Hz	701BH
d00.28	Communication setting value	0.01%	701CH
d00.29	reserve	0	701CH

d00.30	Main frequency A display	0.01Hz	701FH
d00.31	Auxiliary frequency B display	0.01Hz	701FH
d00.32	reserve	0	7020H
d00.33	reserve	0	7021H
d00.34	Motor temperature value	1℃	7022H
d00.35	Target torque(%)	O.1%	7023H
d00.36	reserve	0	7024H
d00.37	Power factor perspective	0.1°	7025H
d00.38	Input voltage (V)	0.0 V	7026H
d00.39	VF separation target voltage	1V	7027H
d00.40	VF separation output voltage	1V	7028H
d00.41	Intuitive display of input terminal status	1	7029H
d00.42	Output terminal status intuitive display	1	702AH
d00.43	Input terminal function status intuitive display 1 (function 01-function 40)	1	702BH
d00.44	Input terminal function status visual display 2 (function 41-function 80)	1	702CH
d00.45	accident details	1	702DH
d00.58	reserve	0	703AH
d00.59	Set frequency (%)	0.01%	703BH
d00.60	Operating frequency(%)	0.01%	703CH
d00.61	Inverter status	1	703DH
d00.62	Current fault code	1	703EH
d00.63	reserve	0.00%	703FH
d00.64	reserve	0.01%	7040H
d00.65	Torque upper limit	0.10%	7041H
d00.66～d00.78	reserve	-	-
d00. 79	set temperature	1 ℃	704 F H

Chapter VII Function parameter description

F0 Group 0 - Basic Function Group

F 00 .00	Function macro definition	
	0～100	0

0: General mode

1: One variable frequency pump and two industrial frequency pumps (1 variable frequency pump + 2 industrial frequency pumps) water supply mode

2: Three-pump circulation soft start (3 variable frequency pumps) water supply mode
3: One variable frequency pump + three industrial frequency pumps (1 variable frequency pump + 3 industrial frequency pumps) water supply mode
4: One variable frequency pump and two industrial frequency pumps (1 variable frequency pump + 2 industrial frequency pumps) water supply mode
5: One variable frequency pump and one industrial frequency pump (1 variable frequency pump + 1 industrial frequency pump) water supply mode
6: Single pump water supply mode
7: Photovoltaic water supply voltage tracking mode
8: Photovoltaic water supply power tracking VF mode
9: Photovoltaic water supply power tracking SVC mode
10-100: Reserved
Note: Initialize the parameters first, then set the macro function.

F00. 0 1	control method	
	0～1	0

0: V/F control
When a single inverter is required to drive more than one motor, and when the motor parameters cannot be self-learned correctly or the controlled motor parameters cannot be obtained through other means, this control method is selected. This control method is the most commonly used motor control method and can be used in any occasion where the motor control performance requirements are not high.
1: Speed sensorless vector control (motor parameters are more sensitive)
The real current vector control method has the high torque output performance of the flux control method and the flexible torque output effect. It can be said to be a combination of rigidity and flexibility. However, this control method is sensitive to the motor parameters. It is best to enable the dynamic self-learning of the motor parameters before use, otherwise the effect will not be good.

F00. 0 2	Run command channel selection	
	0～2	0

This function code selects the physical channel through which the inverter receives operation commands such as run and stop.
0: Operation panel running command channel
Operation control is implemented by buttons such as , STOP/RESET, etc. M-FUNC on the operation panel . RUN
1: Terminal operation command channel
Operation control is implemented by multi-function terminals defined as FWD, REV, FJOG , RJOG and other functions.
2: Communication operation command channel
The operation control is implemented by the host computer through communication.

⚠**Notice:**
Even during operation, the operation command channel can be changed by modifying the setting value of this function code. Please set it with caution!

F00. 0 3	Main frequency source A selection	
	0～ 11	4

0: Digital setting (no memory after power failure)
The initial value of the set frequency is the value of F00.08 "preset frequency". The set frequency value of the inverter can be changed by the ▲ and ▼ keys on the keyboard (or the UP and DOWN keys of the multi-function input terminal). When the inverter is powered off and then powered on again, the set frequency value is restored to the value of F00.08 "digital setting preset frequency".
1: Digital setting (power-off memory)
The initial value of the set frequency is the value of F00.08 "preset frequency". The set frequency value of the inverter can be changed by using the ▲ and ▼ keys on the keyboard (or the UP and DOWN keys of the multi-function input terminal).
When the inverter is powered off and then powered on again, the set frequency is the set frequency at the last power-off time, and the correction amount through the keyboard ▲, ▼ keys or terminal UP, DOWN is memorized.
It should be noted that F00.23 is "Digital setting frequency stop memory selection". F00.23 is used to select whether the frequency correction value is memorized or cleared when the inverter stops. F00.23 is related to shutdown, not power-off memory, so please pay attention to it in application.
2: AI1 analog setting (0～10V/20mA)
AI1 can be 0V ~ 10V voltage input or 4mA ~ 20mA current input, which is selected by the JP3 jumper on the control board.
3: AI2 analog setting (0~10V)
AI2 is 0V ~ 10V voltage input.
4: Panel potentiometer setting
5. Pulse setting (X7)
The frequency setting is given by the high-speed pulse of terminal X7; the pulse setting signal specifications: voltage range 9V ~ 30V, frequency range 0kHz ~ 100kHz. The pulse setting can only be input from the multi-function input terminal X7. The relationship between the X7 terminal input pulse frequency and the corresponding setting is set through F07.28 ~ F07.31. The corresponding relationship is a linear relationship between 2 points. The 100.0% setting corresponding to the pulse input refers to the percentage of the relative maximum frequency F00.10.
6. Multi-segment instructions
When selecting the multi-segment instruction operation mode, you need to use different state combinations of the digital input X terminal to correspond to different set frequency values. You can set 4 multi-segment instruction terminals (terminal functions 12 to 15). The 16 states of the 4 terminals can correspond to any 16 "multi-segment instructions" through the F10 group function code. The "multi-segment instruction" is a percentage of the maximum frequency F00.10. When the digital input X terminal is used as a multi-segment instruction terminal function, it is necessary to make corresponding settings in the F07 group. For details, please refer to the description of the relevant function parameters of the F07 group.
7. Simple PLC
When the frequency source is simple PLC, the inverter's operating frequency source can be switched between 1 to 16 arbitrary frequency commands. The retention time and respective acceleration and deceleration time of 1 to 16 frequency commands can also be set by the user. For details, refer to the relevant instructions of Group F10.
8.PID
Select the output of process PID control as the operating frequency. It is generally used for on-site process closed-loop control, such as constant pressure closed-loop control, constant tension closed-loop control, etc. When using PID as the frequency source, you need to set the relevant parameters of F09 group "PID function".
9. Communication setting

Change the set frequency through the serial port frequency setting command, see F13 group communication parameters for details.
10: Multi-pump instruction
F00.00 is valid from 1 to 6 and is used for constant pressure water supply.
11、MPPT setting (photovoltaic water supply)
See F16.08~F16.24 for details, used for photovoltaic water supply.

F00. 0 4	Auxiliary frequency source B selection	
	0～11 (same as main frequency channel selection)	0

0: Digital setting (no memory after power failure)
1: Digital setting (power-off memory)
2: AI1 analog setting (0～10V/20mA)
3: AI2 analog setting (0~10V)
4: Panel potentiometer setting
5: Pulse setting (X7)
6: Multi-segment instructions
7: Simple PLC
8: PID
9: Communication setting
10: Multi-pump instruction
11: MPPT setting (photovoltaic water supply)

The meanings of the auxiliary frequency given channel are the same as those of the main frequency given channel. Please refer to F00.03 for detailed description.

F00. 0 5	Auxiliary frequency source B range selection when superimposing	
	0～1	0

0: relative to the maximum frequency
1: relative to frequency source A

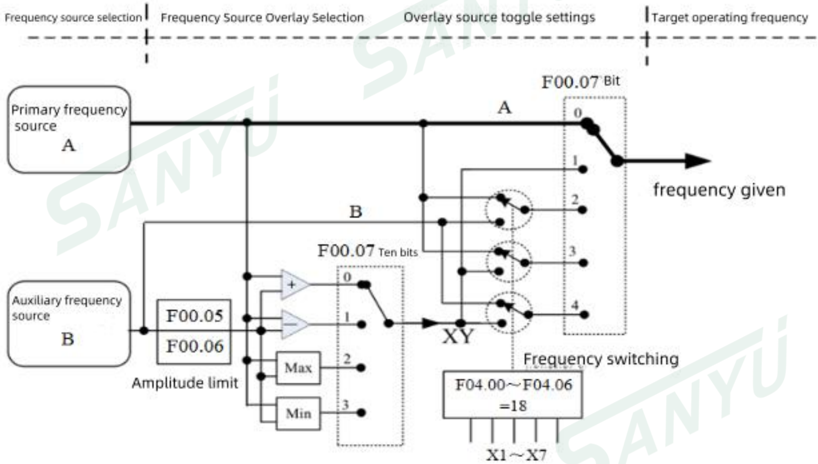
F00. 0 6	Auxiliary frequency source B range when superimposed	
	0% ～ 150%	100%

When the frequency source is selected as "frequency superposition" (i.e. F00.07 is set to 1, 3 or 4), these two parameters are used to determine the adjustment range of the auxiliary frequency source. F00.05 is used to determine the object corresponding to the auxiliary frequency source range. It can be selected relative to the maximum frequency or relative to the main frequency source A. If it is selected relative to the main frequency source, the range of the auxiliary frequency source will change with the change of the main frequency A.

F00. 0 7	Frequency source B superposition selection	
	00～34	0 0

Units: Frequency source selection
0: Main frequency source A
1: Primary and secondary operation results (the operation relationship is determined by the tens digit)
2: Switch between main frequency source A and auxiliary frequency source B
3: Switch between main frequency source A and main and auxiliary operation results
4: Switch between auxiliary frequency source B and main and auxiliary operation results
Tens digit: main and auxiliary operation relationship of frequency source
0: Main + Auxiliary
1: Primary - Secondary

2: The maximum value of the two
3: The minimum of the two
The frequency setting channel is selected by this parameter. The frequency setting is realized by the combination of the main frequency source A and the auxiliary frequency source B.



When the frequency source is selected as the main and auxiliary operation, the bias frequency can be set through F 00.21 to superimpose the bias frequency on the main and auxiliary operation results.
To flexibly respond to various needs.

F00.08	Preset frequency	
	0.00Hz～maximum frequency (F00.10)	50.00Hz

When the frequency source is selected as "digital setting" or "terminal UP/DOWN", the function code value is the frequency digital setting of the inverter.

F00.09	Running direction	
	0～ 1	0

0: The direction is consistent
1: Opposite direction
By changing this function code, the purpose of changing the motor direction can be achieved without changing the motor wiring. Its function is equivalent to adjusting the motor (U,
Any two lines (V, W) can realize the conversion of motor rotation direction.
Tip: After the parameters are initialized, the motor direction will return to its original state. Use with caution in situations where it is strictly forbidden to change the motor direction after the system is debugged.

F00. 1 0	Maximum frequency	
	50.00Hz ～ 500.00Hz	50.00

When analog input, pulse input (X7), multi-segment instructions, etc. are used as frequency sources, their respective 100.0% are calibrated relative to F00.10. The maximum output frequency can reach 5000.0Hz. In order to take into account both the frequency instruction resolution and the frequency input range, the number of decimal

places of the frequency instruction can be selected through F00.22. When F00.22 is selected as 1, the frequency resolution is 0.1Hz, and the setting range of F00.10 is 50.0Hz ~ 5000.0Hz; when F00.22 is selected as 2, the frequency resolution is 0.01Hz, and the setting range of F00.10 is 50.00Hz ~ 500.00Hz.
Note: Modifying F00.22 will change the frequency resolution of all frequency-related function parameters.

F00. 1 1	Upper frequency source	
	0～5	0

0: F00.12 setting
1: AI1
2: AI2
3: Panel potentiometer
4: PULSE setting
5: Communication setting

Define the source of the upper limit frequency. The upper limit frequency can come from digital setting (F00.12), analog input, PULSE setting or communication setting. When using analog AI1, AI2 setting, PULSE setting (X7) or communication setting, it is similar to the main frequency source, see F00.03 introduction. For example, when the torque control method is used in the winding control site, in order to avoid the "flying car" phenomenon caused by material breakage, the upper limit frequency can be set by analog. When the inverter runs to the upper limit frequency value, the inverter keeps running at the upper limit frequency.

F00. 1 2	Upper frequency	
	Lower limit frequency F00.14 ~ Maximum frequency F00.10	50.00

Set the upper limit frequency, the setting range is F00.14 ~ F00.10.

F00. 1 3	Upper frequency offset	
	0.00Hz ~ Maximum frequency F00.10	0.00

When the upper limit frequency source is set to analog or PULSE setting, F00.13 is used as the offset of the set value, and the offset frequency is superimposed on the upper limit frequency value set by F00.11 as the final upper limit frequency setting value.

F00.14	Lower frequency	
	0.00Hz ~ upper limit frequency F00.12	0.00

When the frequency command is lower than the lower limit frequency set by F00.14, the inverter can stop, run at the lower limit frequency or run at zero speed. The operating mode can be set by F02.14 (setting the frequency lower than the lower limit frequency operating mode).

F00.15	Carrier frequency	
	0.5 ～16.0KHz	Model settings

This function code is used to set the carrier frequency of the inverter output PWM wave. The carrier frequency will affect the noise of the motor during operation. For occasions that require silent operation, the carrier frequency can be appropriately increased to meet the requirements. However, increasing the carrier frequency will increase the heat generated by the inverter and increase the electromagnetic interference to the outside world.

When the carrier frequency exceeds the factory setting, the inverter needs to be derated. Generally, the inverter current needs to be derated by about 5% for every 1KHz increase in the carrier.

F00.16	Carrier frequency adjusts with temperature	
	0～1	0

0: No
1: Yes

The carrier frequency is adjusted with the temperature. When the inverter detects that the temperature of its own radiator is high, it automatically reduces the carrier frequency to reduce the temperature rise of the inverter. When the radiator temperature is low, the carrier frequency gradually returns to the set value. This function can reduce the chance of the inverter overheating alarm.

F00.17	Acceleration time 1	
	0.00s ～ 650.00s (F00.19=2) 0.0s ～ 6500.0s (F00.19=1) 0s ～ 65000s (F00.19=0)	Model settings
F00.18	Deceleration time 1	
	0.00s ～ 650.00s (F00.19=2) 0.0s ～ 6500.0s (F00.19=1) 0s ～ 65000s (F00.19=0)	Model settings

Acceleration time refers to the time required for the inverter to accelerate from zero frequency to the acceleration/deceleration reference frequency (determined by F00.25), see t1 in Figure F00-1.

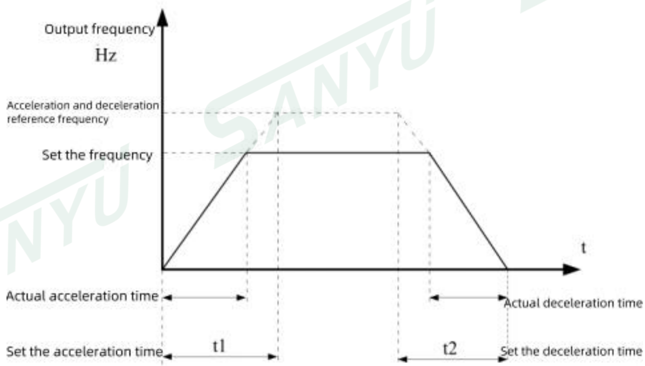


Figure F00-1 Schematic diagram of acceleration time and deceleration time

F00.19	Acceleration and deceleration time unit	
	0～2	1

0: 1 second
1: 0.1 sec
2: 0.01 sec

When modifying the function parameters, the number of decimal places displayed for the 4 groups of acceleration and deceleration time will change, and the corresponding acceleration and deceleration time will also change. Pay special attention to this during application.

F00.20	reserve	
	reserve	0
F00.21	Auxiliary frequency source offset frequency when superimposed	

	0.00Hz ~ Maximum frequency F00.10	0.00

This function code is only valid when the frequency source is selected as the main and auxiliary operation. When the frequency source is the main and auxiliary operation, F00.21 is used as the bias frequency, and is superimposed with the main and auxiliary operation results as the final frequency setting value, making the frequency setting more flexible.

F00.22	Frequency command resolution	
	1～2	2

1: 0.1Hz
2: 0.01Hz
This parameter is used to determine the resolution of all frequency-related function codes. When the frequency resolution is 0.1Hz, the maximum output frequency can reach 5000.0Hz, and when the frequency resolution is 0.01Hz, the maximum output frequency is 500.00Hz.

F00.23	Digital setting frequency stop memory selection	
	0～1	0

0: No memory
1: Memory
This function is only valid when the frequency source is digitally set. "No memory" means that after the inverter stops, the digital setting frequency value is restored to the value of F00.08 (preset frequency), and the frequency correction performed by the keyboard ▲, ▼ keys or terminal UP, DOWN is cleared. "Memory" means that after the inverter stops, the digital setting frequency is retained as the setting frequency at the last stop time, and the frequency correction performed by the keyboard ▲, ▼ keys or terminal UP, DOWN remains valid.

F00.24	reserve	
	reserve	0
F00.25	Acceleration/deceleration time reference frequency	
	0～2	0

0: Maximum frequency (F00.10)
1: Set frequency
2: 100Hz
Acceleration and deceleration time refers to the acceleration and deceleration time from zero frequency to the frequency set by F0-25. Figure F00-1 is a schematic diagram of acceleration and deceleration time. When F00.25 is selected as 1, the acceleration and deceleration time is related to the set frequency. If the set frequency changes frequently, the acceleration of the motor will change. Please pay attention to this when using it.

F00.26	Frequency command UP/DOWN standard during operation	
	0～1	0

0: operating frequency
1: Set frequency
This parameter is valid only when the frequency source is set digitally. It is used to determine the method to correct the set frequency when the keyboard ▲, ▼ keys or terminal UP/DOWN actions, that is, whether the target frequency is increased or decreased based on the operating frequency or based on the set frequency. The

difference between the two settings is obvious when the inverter is in the acceleration and deceleration process, that is, if the operating frequency of the inverter is different from the set frequency, the different selections of this parameter will be very different.

F00.27	Command source bundled with frequency source	
	0000～9999	0

Units: Operation panel command binding frequency source selection
0: No binding
1: Digital setting frequency
2: AI1
3: AI2
4: Panel potentiometer
5: PULSE setting (X7)
6: Multi-speed
7: Simple PLC
8: PID
9: Communication setting
Tens digit: Terminal command binding frequency source selection (0 to 9, same as ones digit)
Hundreds place: Communication command binding frequency source selection (0 to 9, same as ones place)
Thousands place: Automatic operation binding frequency source selection (0 to 9, same as the ones place)

Define the bundled combination between three operation command channels and nine frequency given channels to facilitate synchronous switching. The meaning of the above frequency given channels is the same as that of the main frequency source A selection F00.03, please refer to the description of the F00.03 function code. Different operation command channels can be bundled with the same frequency given channel. When the command source has a bundled frequency source, the frequency source set by F00.03~F00.07 will no longer work during the validity period of the command source.

F00 . 28	Serial communication protocol selection	
	0～1	0

0: Modbus protocol
1: Keep

F 0 1 Group - Start and Stop Control

F01 . 00	Startup method	
	0～3	0

0: Direct start
If the start DC braking time is set to 0, the inverter will start running from the start frequency. If the start DC braking time is not 0, DC braking will be performed first, and then the inverter will start running from the start frequency. It is suitable for small inertia loads and occasions where the motor may rotate at startup.
1: Speed tracking restart

The inverter first determines the speed and direction of the motor, then starts with the tracked motor frequency, and starts the rotating motor smoothly without impact. It is suitable for restarting after instantaneous power failure of large inertia loads. To ensure the performance of speed tracking restart, the motor F03 group parameters must be accurately set. 2: Asynchronous motor pre-excitation start

It is only valid for asynchronous motors and is used to establish a magnetic field before the motor runs. For the pre-excitation current and pre-excitation time, refer to the description of function code F01.05 and F01.06. If the pre-excitation time is set to 0, the inverter cancels the pre-excitation process and starts from the starting frequency. If the pre-excitation time is not 0, pre-excitation is performed before starting, which can improve the dynamic response performance of the motor.

3: Super fast startup

Only valid in vector mode.

F01 . 01	Speed tracking mode	
	0～2	0

0: Start from the stop frequency

This method is usually used to track downward from the frequency at the time of the power outage.

1: Start from zero speed

Track upward from 0 frequency, used when restarting after a long power outage.

2: Start from the maximum frequency

Tracking downward from the maximum frequency, generally used for power generation loads.

F01 . 02	Speed tracking speed	
	1 ～ 100	2 0

When the speed tracking is restarted, select the speed tracking speed. The larger the parameter, the faster the tracking speed. However, setting it too large may cause the tracking effect to be unreliable.

F01 . 03	Start frequency	
	0.00Hz ～ 10.00Hz	0.00Hz
F01 . 04	Start frequency holding time	
	0.0s ～ 100.0s	0.0s

To ensure the motor torque at startup, please set a suitable starting frequency. To fully establish the magnetic flux when the motor starts, the starting frequency needs to be maintained for a certain time. The starting frequency F01.03 is not limited by the lower limit frequency. However, when the target frequency is set to be lower than the starting frequency, the inverter does not start and is in standby mode. During the forward and reverse switching process, the starting frequency holding time does not work. The starting frequency holding time is not included in the acceleration time, but is included in the running time of the simple PLC.

F01 . 05	Starting DC braking current/ pre-excitation current	
	0% ～ 100%	50%
F01 . 06	Starting DC braking time/ pre-excitation time	
	0.0s ～ 100.0s	0.0s

Starting DC braking is generally used to restart a running motor after stopping it. Pre-excitation is used to establish a magnetic field for the asynchronous motor before starting it, which improves the response speed. Starting DC braking is only effective when the starting mode is direct starting. At this time, the inverter first performs DC braking according to the set starting DC braking current, and then starts running after the starting DC braking time. If the DC braking time is set to 0, it will start directly without DC braking. The larger the DC braking current, the greater the braking force. If the starting mode is asynchronous motor pre-excitation starting, the inverter will first establish a magnetic field according to the set pre-excitation current, and then start running after the set pre-excitation time. If the pre-excitation time is set to 0, it will start directly without the pre-excitation process.

There are two situations for starting DC braking current/pre-excitation current relative to the base value:

1. When the rated current of the motor is less than or equal to 80% of the rated current of the inverter, it is a percentage base value relative to the rated current of the motor.

2. When the motor rated current is greater than 80% of the inverter rated current, it is a percentage base value relative to 80% of the inverter rated current.

F01 . 07	Acceleration and deceleration method	
	0～ 2	0

0: Linear acceleration and deceleration

The output frequency increases or decreases in a straight line. Four acceleration and deceleration times can be selected through the multi-function digital input terminal (F07.00 ~ F07.06).

1: S curve acceleration/deceleration A

The output frequency increases or decreases according to the S curve. The S curve is used in places where smooth start or stop is required, such as elevators, conveyor belts, etc. Function codes F01.08 and F01.09 define the time proportion of the start and end segments of the S curve acceleration and deceleration respectively.

2: S curve acceleration/deceleration B

In the S-curve acceleration/deceler f_b ion B, the motor rated frequency is always the inflection point of the S-curve, as shown in Figure F01-1. It is generally used in situations where rapid acceleration/deceleration is required in the high-speed area above the rated frequency.

When the set frequency is above the rated frequency, the acceleration and deceleration time is:

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

Amo f them, is the f_b et frequency, T he rated frequency of t f_b motor, and is the time to accelerate from 0 frequency to the rated frequency.

F01 . 08	S curve start time ratio	
	0.0% ～ (100.0%-F01.09)	30.0%
F01 . 09	S curve end period time ratio	
	0.0% ～ (100.0%-F01.08)	30.0%

Function codes F01.08 and F01.09 define the time ratio of the start and end segments of S-curve acceleration/deceleration A, respectively. The two function codes must meet the following conditions: F01.08 + F01.09 ≤ 100.0%. In Figure F01-1, t1 is the parameter defined by parameter F01.08. During this period, the slope of the output frequency change gradually increases. t2 is the time defined by parameter F01.09. During this period, the slope of the output frequency change gradually changes to 0. During the time between t1 and t2, the slope of the output frequency change is fixed, that is, linear acceleration/deceleration is performed in this interval.

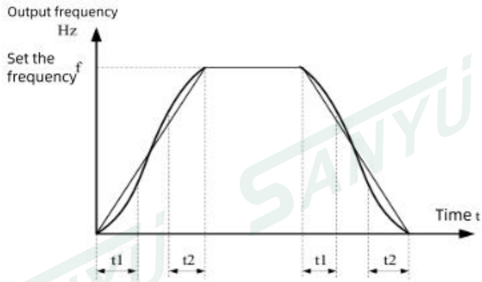


Figure F01-1 Schematic diagram of curve acceleration and deceleration A

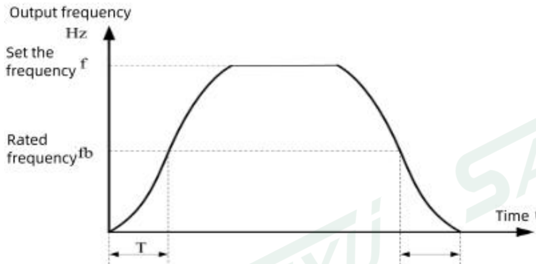


Figure F01 - 2 Schematic diagram of curve acceleration and deceleration B

F01.10	Shutdown mode	
	0～1	0

0: Deceleration and stop
After receiving the stop command, the inverter gradually reduces the output frequency according to the deceleration time, and stops after the frequency drops to zero. If the shutdown DC braking function is effective, after reaching the shutdown DC braking starting frequency (according to the setting of F01.11, it may take a shutdown DC braking waiting time), the DC braking process will be executed, and then the inverter will stop.
1: Free stop
After receiving the stop command, the inverter immediately stops output and the load stops freely according to mechanical inertia.

F01.11	DC braking start frequency at shutdown	
	0.00～Maximum frequency	0.00
F01. 1 2	DC braking waiting time for shutdown	
	0.0～100.0s	0.0
F01. 1 3	DC braking current at shutdown	
	0.0～100%	5 0%
F01. 1 4	DC braking time at shutdown	
	0.0: DC braking does not work 0.0～100.0s	0.0

DC braking start frequency at shutdown: During the deceleration shutdown process, when the operating frequency drops to this frequency, the DC braking process starts. DC braking waiting time at shutdown: After the operating frequency drops to the DC braking start frequency at shutdown, the inverter stops outputting for a period of time before starting the DC braking process. This is used to prevent overcurrent and other faults that may be caused by starting DC braking at a higher speed.

Stop DC braking current: Stop DC braking current, there are two situations relative to the base value.

1. When the rated current of the motor is less than or equal to 80% of the rated current of the inverter, it is a percentage base value relative to the rated current of the motor.

2. When the rated current of the motor is greater than 80% of the rated current of the inverter, it is a percentage base value relative to 80% of the rated current of the inverter.

DC braking time at shutdown: the time during which the DC braking value is maintained. If this value is 0, the DC braking process is cancelled. The DC braking process at shutdown is shown in Figure F01-3 .

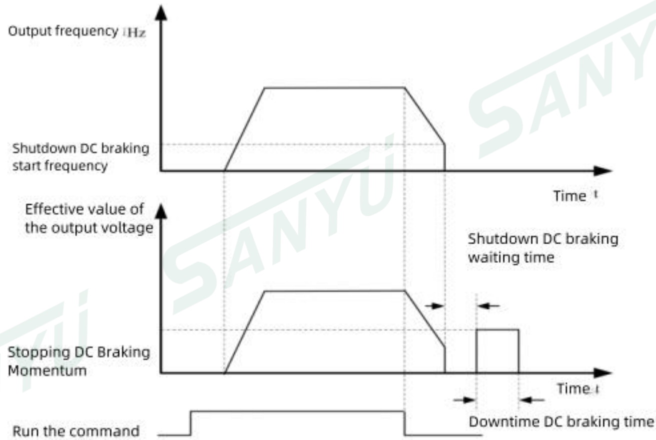


Figure F01-3 DC braking diagram of shutdown

F01.15	Braking rate	
	0% ～ 100%	100%

It is only effective for inverters with built-in braking units; it is used to adjust the duty cycle of the braking unit. If the braking utilization rate is high, the braking unit action duty cycle is high and the braking effect is strong, but the inverter bus voltage fluctuates greatly during the braking process.

F01.16 ～ F01.20	reserve	
	reserve	0
F01.21	Speed tracking delay	
	0.00 ～ 5.00s	0.50s

Before the inverter starts tracking the speed, it will start after this delay.

F 02 Group - Auxiliary functions

F02.00	Jog operation frequency	
	0.00Hz ~ Maximum frequency	2.00Hz
F02.01	Jog acceleration time	
	0.0s ～ 6500.0s	20.0s
F02.02	Jog deceleration time	
	0.0s ～ 6500.0s	20.0s

Define the given frequency and acceleration/deceleration time of the inverter during jogging; during jogging operation, the starting mode is fixed to direct starting mode (F01.00=0), and the stopping mode is fixed to deceleration stop (F01.10=0).

F02.03	Acceleration time 2	
	0.0s ～ 6500.0s	Model settings
F02.04	Deceleration time 2	
	0.0s ～ 6500.0s	Model settings
F02.0 5	Acceleration time 3	
	0.0s ～ 6500.0s	Model settings
F02.0 6	Deceleration time 3	
	0.0s ～ 6500.0s	Model settings
F02.0 7	Acceleration time 4	
	0.0s ～ 6500.0s	Model settings
F02.0 8	Deceleration time 4	
	0.0s ～ 6500.0s	Model settings

Four acceleration and deceleration times can be defined, and the acceleration and deceleration times 1 to 4 during the operation of the inverter can be selected through different combinations of control terminals . Please refer to the definition of the acceleration and deceleration time terminal functions in F07.00 to F07.06.

F02.09	Hop frequency 1	
	0.00Hz ~ Maximum frequency	0.00
F02.10	Hop frequency 2	
	0.00Hz ~ Maximum frequency	0.00
F02.11	Jump frequency amplitude	
	0.00Hz ~ Maximum frequency	0.00

When the set frequency is within the jump frequency range, the actual operating frequency will run at the jump frequency that is closer to the set frequency. By setting the jump frequency, the inverter can avoid the mechanical resonance point of the load. Two jump frequency points can be set. If both jump frequencies are set to 0, the jump frequency function is canceled.

For the principle diagram of jump frequency and jump frequency amplitude, please refer to Figure F01-4 .

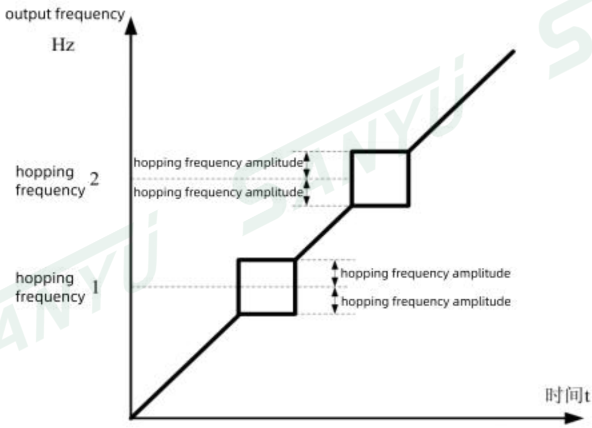


Figure F01-4 Schematic diagram of jump frequency

F02 . 12	Forward and reverse dead time	
	0.0s ～ 3000.0s	0.0s

Set the transition time at output 0Hz during the inverter forward and reverse transition process, as shown in Figure F01-5:

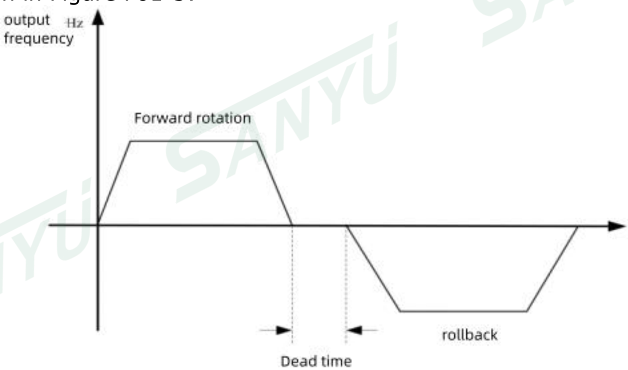


Figure F01-5 Schematic diagram of forward and reverse dead time

F02 . 13	Reverse frequency prohibition	
	0～1	0

0: Invalid
1: Valid

When the frequency given by "communication given" or "analog given" is negative, the direction of the motor will change, and this frequency is called "reverse frequency"; this parameter is used to set whether the inverter is allowed to run in reverse state. If the motor reversal is not allowed, set F02.13=1.

F02.14	The set frequency is lower than the lower limit frequency operation mode	
	0～2	0

0: Run at the lower frequency limit

When the set frequency is lower than the lower limit frequency setting value (F00.14), the inverter runs at the lower limit frequency.

1: Shutdown

When the set frequency is lower than the lower limit frequency setting value (F00.14), the inverter stops.

2: Zero speed operation

When the set frequency is lower than the lower limit frequency setting value (F00.14), the inverter runs at zero frequency.

F02 . 15	Droop control	
	0.00Hz ～ 10.00Hz	0.00Hz

This function is generally used for load distribution when multiple motors are driving the same load; droop control means that as the load increases, the inverter output frequency decreases, so that when multiple motors are driving the same load, the output frequency of the motor in the load decreases more, thereby reducing the load of the motor and achieving uniform load on multiple motors. This parameter refers to the frequency drop value when the inverter outputs the rated load.

F02 . 16	Set the cumulative power-on arrival time	
	0h ～ 65000h	0h
F02 . 17	Set the cumulative running arrival time	
	0h ～ 65000h	0h

When the accumulated power-on time (F14.11) reaches the power-on time set by F02.16, the inverter multi-function output terminal outputs an ON signal.

F02 . 18	Start protection selection	
	0 to 1	0

0: No protection

1: Protection

This parameter involves the safety protection function of the inverter; if this parameter is set to 1, if the run command is valid when the inverter is powered on (for example, the terminal run command is in a closed state before power-on), the inverter will not respond to the run command. The run command must be removed once, and the inverter will respond after the run command is valid again. In addition, if this parameter is set to 1, if the run command is valid when the inverter fault is reset, the inverter will not respond to the run command. The run command must be removed to eliminate the run protection state. Setting this parameter to 1 can prevent the danger caused by the motor responding to the run command when power is turned on or when a fault is reset without knowing it.

F02 . 19	Frequency detection value (FDT1)	
	0.00Hz ~ Maximum frequency	50.00Hz
F02 . 20	Frequency detection hysteresis value (FDT1)	
	0.0% to 100.0% (FDT1 level)	5.0%

When the operating frequency is higher than the frequency detection value, the inverter multi-function output terminal outputs an ON signal, and when the frequency is lower than the detection value by a certain frequency value, the multi-function output terminal outputs an ON signal. The above parameters are used to set the detection value of the output frequency and the hysteresis value of the output action release. Among them, F02.20 is the percentage of the hysteresis frequency relative to the frequency detection value F02.19. Figure F01-6 is a schematic diagram of the FDT function.

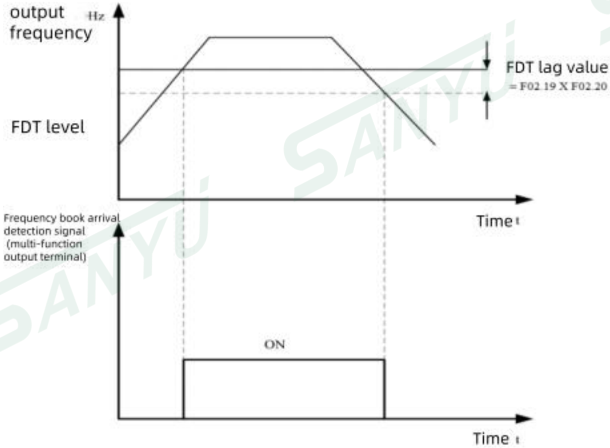


Figure F01-6 FDT level diagram

F02 . 21	Frequency arrival (FAR) detection width	
	0.0% ~ 100.0% (maximum frequency)	0.0%

This function is a supplementary explanation for the 4th function of function code F08.02 to F08.05. When the output frequency of the inverter is within the positive and negative detection width of the set frequency, the terminal outputs a valid signal (collector open circuit signal, which is low level after being pulled up by a resistor), as shown in the figure below.

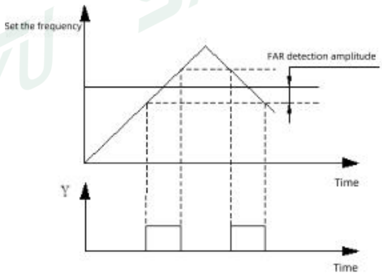


Figure F01-7 Schematic diagram of frequency arrival detection amplitude

F02 . 22	Is the jump frequency valid during acceleration and deceleration?	
	0 to 1	0

0: Invalid
1: Valid
This function code is used to set whether the jump frequency is valid during the acceleration and deceleration process; when it is set to be valid, when the operating frequency is within the jump frequency range, the actual operating frequency will jump over the set jump frequency boundary. Figure F01-8 is a schematic diagram of the jump frequency being valid during the acceleration and deceleration process.

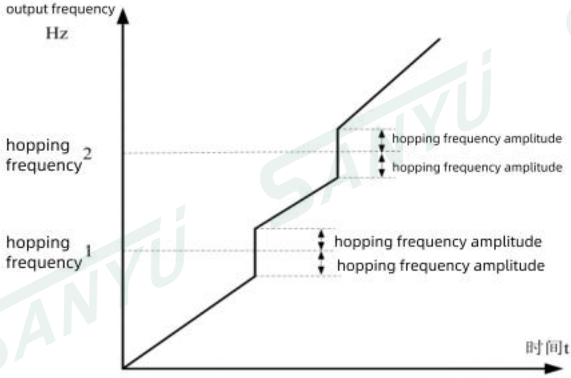


Figure F01-8 Schematic diagram of effective jump frequency during acceleration and deceleration

F02 . 23	Switching frequency point between acceleration time 1 and acceleration time 2	
	0.00Hz ~ Maximum frequency	0.00Hz
F02 . 24	Switching frequency point between deceleration time 1 and deceleration time 2	
	0.00Hz ~ Maximum frequency	0.00Hz

This function is valid when the acceleration/deceleration time is not selected through the X terminal. It is used to select different acceleration/deceleration times according to the operating frequency range instead of through the X terminal during the operation of the inverter.

F02 . 25	Terminal jog priority	
	0 to 1	0

0: Invalid
1: Valid

This parameter is used to set whether the terminal jog function has the highest priority; when the terminal jog priority is valid, if a terminal jog command appears during operation, the inverter switches to the terminal jog operation state.

F02 . 26	Frequency detection value (FDT 2)	
	0.00Hz ~ Maximum frequency	50.00Hz
F02 . 27	Frequency detection hysteresis value (FDT2)	
	0.0% to 100.0% (FDT2 level)	5.0%

The frequency detection function is exactly the same as that of FDT1. Please refer to the relevant instructions of FDT1, that is, the instructions of function codes F02.19 and F02.20.

F02 . 28	Arbitrary frequency detection value 1	
	0.00Hz ~ Maximum frequency	50.00Hz
F02 . 29	Any frequency detection width 1	
	0.0% ~ 100.0% (maximum frequency)	0.0 %
F02 . 30	Arbitrary arrival frequency detection value 2	
	0.00Hz ~ Maximum frequency	50.00Hz
F02 . 31	Any frequency detection width 2	

	0.0% ~ 100.0% (maximum frequency)	0.0 %

When the output frequency of the inverter is within the positive and negative detection range of any reaching frequency detection value, the multi-function output terminal outputs an ON signal.
There are two groups of arbitrary frequency detection parameters, which set the frequency value and frequency detection range respectively. Figure F01-9 is a schematic diagram of this function.

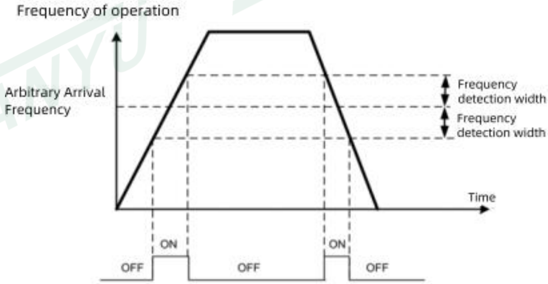


Figure F01-9 Schematic diagram of arbitrary arrival frequency detection

F02 . 32	Zero current detection level	
	0.0% ～ 300.0%	50.00Hz
F02 . 33	Zero current detection delay time	
	0.01s ～ 600.00s	0.10s

When the inverter output current is greater than or exceeds the limit detection point, and the duration exceeds the software overcurrent point detection delay time, the inverter multi-function output terminal outputs an ON signal. Figure F01-10 is a schematic diagram of the output current overlimit function.

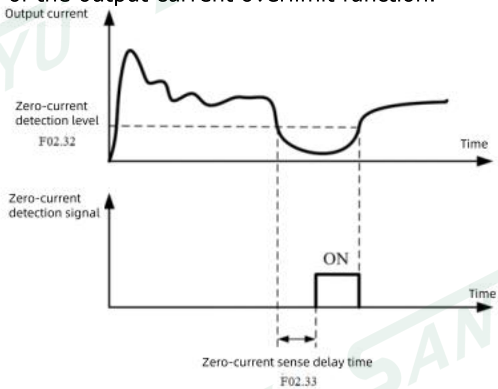


Figure F01-10 Schematic diagram of zero current detection

F02 . 34	Output current exceeds limit	
	0.0% ～ 300.0%	200.0%
F02 . 35	Output current over-limit detection delay time	
	0.00s ～ 600.00s	0.00s

When the inverter output current is greater than or exceeds the limit detection point and lasts longer than the software overcurrent point detection delay time, the inverter multi-function output terminal outputs an ON signal. Figure F01-11 is a schematic diagram of the output current overlimit function.

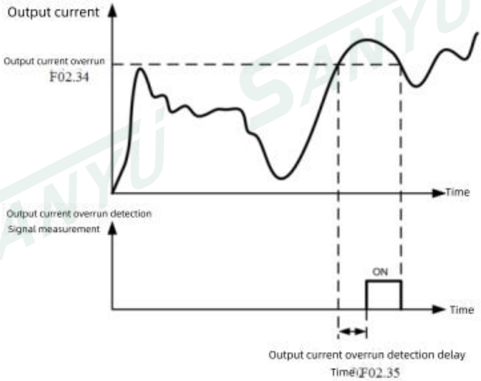


Figure F01-11 Schematic diagram of output current over-limit detection

F02 . 36	Arbitrary current 1	
	0.0% ~ 300.0% (motor rated current)	100.0%
F02 . 37	Arbitrary current 1 width	
	0.0% ~ 300.0% (motor rated current)	0.0 %
F02 . 38	Arbitrary current 2	
	0.0% ~ 300.0% (motor rated current)	100.0%
F02 . 39	Arbitrary current 2 width	
	0.0% ~ 300.0% (motor rated current)	0.0 %

When the output current of the inverter is within the positive and negative detection width of the set arbitrary arrival current, the inverter multi-function output terminal outputs an ON signal. There are two sets of arbitrary arrival current and detection width parameters. Figure F01-12 is a functional schematic diagram.

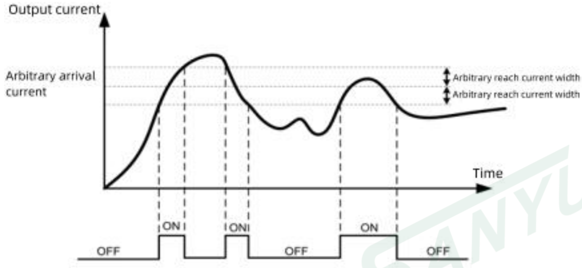


Figure F01-12 Schematic diagram of arbitrary arrival frequency detection

F02 . 40	Timing function selection	
	0 to 1	0

0: Invalid
1: Valid

F02 . 41	Scheduled running time selection	
	0 to 3	0

0: F02.42 setting
1: AI1
2: AI2
3: Panel potentiometer

F02 . 42	Scheduled running time	
	0.0Min ～ 6500.0Min	0.0Min

This group of parameters is used to complete the inverter timing operation function; when the F02.40 timing function is selected to be valid, the inverter starts timing when it starts, and when the set timing operation time is reached, the inverter automatically stops, and the multi-function output terminal outputs an ON signal. Each time the inverter starts, the timing starts from 0, and the remaining timing operation time can be viewed through d00.20. The timing operation time is set by F02.41 and F02.42, and the time unit is minutes.

F02 . 43	AI1 input voltage protection value lower limit	
	0.00V ～ F02.44	3.10V
F02 . 44	AI1 input voltage protection value upper limit	
	F02.43～11.00V	6.80V

When the analog input AI1 value is greater than F02.44, or AI1 input is less than F02.43, the inverter multi-function output terminal outputs “AI1 input
"Input over limit" ON signal is used to indicate whether the input voltage of AI1 is within the set range.

F02 . 45	Module temperature reaches	
	0℃～ 100℃	75℃

When the inverter heat sink temperature reaches this temperature, the inverter multi-function output terminal outputs the "module temperature reached" ON signal.

F02 . 46	Cooling fan control	
	0～ 1	0

0: Fan runs during operation
1: The fan is always running
Used to select the action mode of the cooling fan. When 0 is selected, the fan runs when the inverter is in operation. When the inverter is in shutdown state, if the radiator temperature is higher than 40 degrees, the fan runs. When the radiator temperature is lower than 40 degrees, the fan does not run. When 1 is selected, the fan runs after power-on.

F02 . 47	Wake-up frequency	
	Sleep frequency (F02.49) ~ maximum frequency (F00.10)	0.00Hz
F02 . 48	Wake-up delay time	
	0.0s ～ 6500.0s	0.0s
F02 . 49	Sleep frequency	
	0.00Hz ~ wake-up frequency (F02.47)	0.00Hz
F02 . 50	Sleep delay time	
	0.0s ～ 6500.0s	0.0s

This group of parameters is used to realize the sleep and wake-up functions in water supply applications; during the operation of the inverter, when the set frequency is less

than or equal to the sleep frequency F02.49, after the delay time F02.50, the inverter enters the sleep state and automatically stops. If the inverter is in the sleep state and the current operation command is valid, when the set frequency is greater than or equal to the wake-up frequency F02.47, after the delay time F02.48, the inverter starts.
In general, please set the wake-up frequency to be greater than or equal to the sleep frequency. If both the wake-up frequency and the sleep frequency are set to 0.00Hz, the sleep and wake-up functions are invalid. When the sleep function is enabled, if the frequency source uses PID, whether the sleep state PID is calculated is affected by function code F09.28.
At this time, PID operation during stop must be selected (F09.28=1).

F02 . 51	Arrival time setting for this run	
	0.0～6500.0Min	0.0Min

When the running time of this startup reaches this time, the inverter's multi-function output terminal outputs the "this running time is reached" ON signal.

F02 . 52	Output power correction factor	
	0.00% ～ 200.0%	100.0%

When the output power (d00.05) does not correspond to the expected value, this value can be used to perform a linear correction on the output power.

F 03 Group - Motor Parameters

F03. 00	Motor Type Selection	
	0～1	0

0: Ordinary asynchronous motor
1: Variable frequency asynchronous motor

F03. 01	Motor rated power	
	0.1kW ～ 1000.0kW	Model settings
F03. 0 2	Motor rated voltage	
	1V ～ 2000V	Model settings
F03. 0 3	Motor rated current	
	0.01A ~ 655.35A (inverter power <= 55kW) 0.1A ~ 6553.5A (Inverter power>55kW)	Model settings
F03 . 04	Motor rated frequency	
	0.01Hz ~ Maximum frequency	Model settings
F03 . 05	Motor rated speed	
	1rpm～65535rpm	Model settings

The above function codes are the motor nameplate parameters. Regardless of whether VF control or vector control is used, the relevant parameters need to be accurately set according to the motor nameplate. In order to obtain better VF or vector control performance, motor parameter tuning is required, and the accuracy of the adjustment result is closely related to the correct setting of the motor nameplate parameters.

F03. 06	Stator resistance of asynchronous motor	
	0.001Ω～65.535Ω(Inverter power ≤ 55kW) 0.0001Ω～6.5535Ω(Inverter power>55kW)	Tuning parameters

F03. 07	Asynchronous motor rotor resistance	
	0.001Ω～65.535Ω(Inverter power ≤ 55kW) 0.0001Ω～6.5535Ω(Inverter power>55kW)	Tuning parameters
F03. 08	Leakage inductance of asynchronous motor	
	0.01mH ～ 655.35mH (Inverter power ≤ 55kW) 0.001mH ～ 65.535mH (Inverter power>55kW)	Tuning parameters
F03. 09	Asynchronous motor mutual inductance	
	0.1mH ～ 6553.5mH (Inverter power ≤ 55kW) 0.01mH ~ 655.35mH (inverter power>55kW)	Tuning parameters
F03. 10	Asynchronous motor no-load current	
	0.01A ~ F03.03 (Inverter power ≤ 55kW) 0.1A ~ F03.03 (Inverter power>55kW)	Tuning parameters

F03.06~F03.10 are the parameters of asynchronous motors. These parameters are generally not on the motor nameplate and need to be obtained through automatic tuning of the inverter. Among them, "asynchronous motor static tuning" can only obtain three parameters of F03.06~F03.08, while "asynchronous motor complete tuning" can obtain all 5 parameters here, as well as current loop PI parameters. When changing the rated power of the motor (F03.01) or the rated voltage of the motor (F03.02), the inverter will automatically modify the parameter values of F03.06~F03.10 and restore these 5 parameters to the commonly used standard Y series motor parameters. If the asynchronous motor cannot be tuned on site, you can enter the corresponding function code above according to the parameters provided by the motor manufacturer.

F03.10 ～ F03.36	reserve	
	reserve	0
F03.37	Tuning selection	
	0 to 3	0

0: No operation, i.e. tuning is prohibited.
1: Asynchronous motor static tuning

It is suitable for the occasions where the asynchronous motor and the load are not easy to be disconnected and cannot be fully tuned. Before performing the static tuning of the asynchronous motor, the motor type and the motor nameplate parameters F03.00~F03.05 must be correctly set. For the static tuning of the asynchronous motor, the inverter can obtain the three parameters F03.06~F03.08.

Action description: Set the function code to 1, then press the RUN key, the inverter will perform static tuning

2: Complete tuning of asynchronous motor

To ensure the dynamic control performance of the inverter, please select complete tuning. At this time, the motor must be disconnected from the load to keep the motor in a no-load state.

During the complete tuning process, the inverter first performs static tuning, then accelerates to 80% of the motor rated frequency according to the acceleration time F00.17, maintains for a period of time, decelerates to stop according to the deceleration time F00.18 and ends the tuning.

Action description: Set the function code to 2, then press the RUN key, and the inverter will perform complete tuning.

3: Static complete parameter identification

Applicable to the case of no encoder, complete self-learning of motor parameters when the motor is stationary (the motor may still have slight vibration at this time, so pay attention to safety). Before performing the asynchronous motor static complete tuning, the motor type and motor nameplate parameters F3-00~F3-05 must be correctly set. The asynchronous motor static complete tuning, the inverter can obtain five parameters F03.06~F03.10.

F04 Group - Motor Vector Control Parameters

F04. 00	Speed loop proportional gain 1	
	1 ～ 100	30
F04. 01	Speed loop integral time 1	
	0.01s ～ 10.00s	0.50s
F04. 02	Switching frequency 1	
	0.00 ～ F04.05	5.00Hz
F04. 03	Speed loop proportional gain 1	
	1 ～ 100	20
F04. 04	Speed loop integral time 1	
	0.01s ～ 10.00s	1.00s
F04. 05	Switching frequency 2	
	F04.02 ~ Maximum frequency	10.00Hz

When the inverter runs at different frequencies, different speed loop PI parameters can be selected. When the operating frequency is less than the switching frequency 1 (F04.02), the speed loop PI adjustment parameters are F04.00 and F04.01. When the operating frequency is greater than the switching frequency 2, the speed loop PI adjustment parameters are F04.03 and F04.04. The speed loop PI parameters between the switching frequency 1 and the switching frequency 2 are two sets of PI parameters linearly switched, as shown in Figure F04-1:

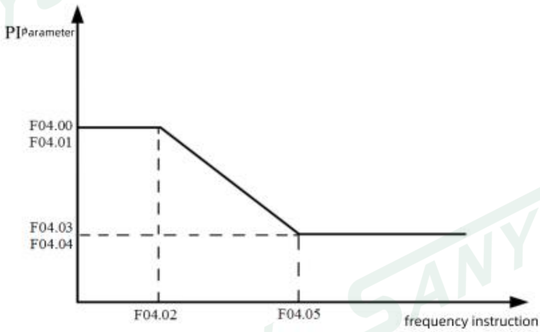


Figure F04-1 PI parameter diagram

By setting the proportional coefficient and integral time of the speed regulator, the speed dynamic response characteristics of the vector control can be adjusted. Increasing the proportional gain and reducing the integral time can speed up the dynamic response of the speed loop. However, too large a proportional gain or too small an integral time may cause the system to oscillate. The recommended adjustment method is: if the factory parameters cannot meet the requirements, fine-tune them based on the factory value parameters, first increase the proportional gain to ensure that the system does not oscillate; then reduce the integral time so that the system has both faster response characteristics and smaller overshoot. If the PI parameters are set improperly, the speed overshoot may be too large. Even an overvoltage fault may occur when the overshoot falls back.

F04.06	Vector control slip gain	
	50% ～ 200%	100%

For speed sensorless vector control, this parameter is used to adjust the motor's steady speeer.
For vector control with speed sensor, this parameter can adjust the output current of the inverter under the same load.

F04.07	Speed loop filter time constant	
	0.000s ～ 0.100s	0.000s

In vector control mode, the output of the speed loop regulator is the torque current command. This parameter is used to filter the torque command. This parameter generally does not need to be adjusted. When the speed fluctuates greatly, the filter time can be appropriately increased; if the motor oscillates, the parameter should be appropriately reduced. If the speed loop filter time constant is small, the inverter output torque may fluctuate greatly, but the speed response is fast.

F04.08	Vector control over excitation gain	
	0 ～ 200	64

During the deceleration process of the inverter, over excitation control can suppress the rise of bus voltage and avoid overvoltage faults. The larger the overexcitation gain, the stronger the suppression effect. For situations where the inverter is prone to overvoltage alarm during deceleration, it is necessary to increase the overexcitation gain. However, if the overexcitation gain is too large, it is easy to increase the output current, which needs to be weighed in the application. For situations with very small inertia, there will be no voltage rise during motor deceleration, so it is recommended to set the overexcitation gain to 0; for situations with brake resistors, it is also recommended to set the overexcitation gain to 0.

F04.09	Torque upper limit source in speed control mode	
	0 ~ 7	64

0: Function code F04.10 setting
1: AI1
2: AI2
3: Panel potentiometer
4: PULSE setting
5: Communication setting
6: MIN(AI1,AI2)
7: MAX(AI1,AI2)

In speed control mode, the maximum value of the inverter output torque is controlled by the torque upper limit source. F04.09 is used to select the setting source of the torque upper limit. When set by analog quantity, PULSE pulse, or communication, the corresponding setting of 100% corresponds to F04.10, and 100% of F04.10 is the rated torque of the inverter.

F04.10	Digital setting of torque upper limit in speed control mode

	0.0% ～ 200.0%	1 6 0.0%
F04.11 F04.12	reserve reserve	0
F04.13	Excitation regulation proportional gain	
	0 ～ 60000	2000
F04.14	Excitation regulation integral gain	
	0 ～ 60000	1300
F04.15	Torque regulation proportional gain	
	0 ～ 60000	2000
F04.16	Torque regulation integral gain	
	0 ～ 60000	1300

Vector control current loop PI adjustment parameter, this parameter is automatically obtained after the asynchronous machine is fully tuned or the synchronous machine is tuned without load, and generally does not need to be modified. It should be noted that the integral regulator of the current loop does not use the integral time as the dimension, but directly sets the integral gain. If the current loop PI gain is set too large, it may cause the entire control loop to oscillate. Therefore, when the current oscillation or torque fluctuation is large, you can manually reduce the PI proportional gain or integral gain here.

F04.17	Speed loop integral separation	
	0 to 1	0

0: Invalid
1: Valid

F04.18 F04.20	reserve reserve	0

F05 Group - Torque Control Parameters

F05. 00	Speed/torque control mode selection	
	0～1	0

0: Speed control
1: Torque control

Used to select the inverter control mode: speed control or torque control; multi-function input X terminal, with two functions related to torque control: torque control prohibition (function 29), speed control/torque control switching (function 46). These two terminals should be used in conjunction with F05.00 to achieve the switching between speed and torque control. When the speed control/torque control switching terminal is invalid, the control mode is determined by F05.00. If the speed control/torque control switching is valid, the control mode is equivalent to the inversion of the value of F05.00. In any case, when the torque control prohibition terminal is valid, the inverter is fixed to the speed control mode.

F05. 0 1	Torque setting source selection in torque control mode	
	0～7	0

0: Digital setting (F05.03)
It means that the target torque directly uses the set value of F05.03.
1: AI1
2: AI2
3: Panel potentiometer
It means that the target torque is determined by AI1, AI2 and panel potentiometer. When AI1 and AI2 are used as frequency reference, the voltage/current input corresponds to the setting of 100.0%, which refers to the percentage of the relative torque digital setting F05.03.
4. PULSE (X7)
The target torque is given through the high-speed pulse of terminal X7. The 100.0% set corresponding to the pulse input refers to the percentage of the relative torque digital setting F05.03.
5. Communication setting
It means that the target torque is given by the communication method. When it is a point-to-point communication slave and receives data as the torque setting, the data transmitted by the host is used as the communication setting value (see the relevant instructions of Group F13).

F05. 0 2	reserve	
	reserve	0
F05. 0 3	Digital setting of torque in torque control mode	
	−200.0% ～ 200.0%	150.0%

The torque setting adopts relative value, 100.0% corresponds to the rated torque of the motor. The setting range is -200.0% to 200.0%, indicating that the maximum torque of the inverter is 2 times the rated torque of the inverter. When the torque setting is positive, the inverter runs forward; when the torque setting is negative, the inverter runs reverse.

F05. 0 4	reserve	
	reserve	0
F05.05	Torque control forward maximum frequency	
	0.00Hz ~ Maximum frequency	50.00Hz
F05.06	Torque control reverse maximum frequency	
	0.00Hz ~ Maximum frequency	50.00Hz

It is used to set the maximum forward or reverse operating frequency of the inverter under torque control. When the inverter is under torque control, if the load torque is less than the motor output torque, the motor speed will continue to rise. In order to prevent accidents such as runaway in the mechanical system, the maximum motor speed under torque control must be limited. If you need to dynamically and continuously change the maximum frequency of torque control, you can use the upper limit frequency control method to achieve this.

F05.07	Torque control acceleration time	
	0.00s ～ 650.00s	0.00s
F05.08	Torque control deceleration time	
	0.00s ～ 650.00s	0.00s

In torque control mode, the difference between the motor output torque and the load torque determines the speed change rate of the motor and the load. Therefore, the motor speed may change rapidly, causing problems such as noise or excessive mechanical stress. By setting the torque control acceleration and deceleration time, the motor speed can be changed smoothly.

However, for situations where a fast torque response is required, the torque control acceleration and deceleration time needs to be set to 0.00s. For example: two motors are hard-connected to drag the same load. To ensure even load distribution, one inverter is set as the host and uses speed control, and the other inverter is set as the slave and uses torque control. The actual output torque of the host is used as the torque command of the slave. At this time, the torque of the slave needs to quickly follow the host, so the torque control acceleration and deceleration time of the slave is 0.00s.

F06 Group - V /F Control Parameters

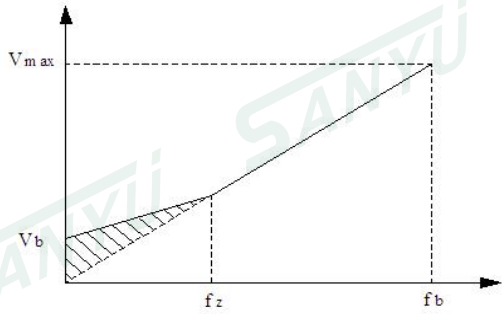
F06. 00	VF curve setting	
	0～11	0

0: Linear V/F
Suitable for normal constant torque loads.
1: Multi-point V/F
Suitable for special loads such as dehydrators and centrifuges. By setting the F06.03 to F06.08 parameters, you can get any
The VF relationship curve is as follows.
2: Square V/F
Suitable for centrifugal loads such as fans and pumps.
3: 1.2 V/F
4: 1.4 V/F
5: Keep
6: 1.6 V/F
7: Reserve
8: 1.8 V/F
3 to 8 VF relationship curve between straight line VF and square VF.
9: Reserve
10: VF complete separation mode
At this time, the output frequency and output voltage of the inverter are independent of each other. The output frequency is determined by the frequency source, while the output voltage is determined by F06.13 (VF separation voltage source). VF complete separation mode is generally used in induction heating, inverter power supply, torque motor control and other occasions.
11: VF semi-separation mode.
In this case, V and F are proportional, but the proportional relationship can be set by the voltage source F06.13, and the relationship between V and F is also related to the rated voltage and rated frequency of the motor in group F03. Assuming that the voltage source input is X (X is a value of 0 to 100%), the relationship between the inverter output voltage V and frequency F is: V/F=2 * X * (rated motor voltage)/(rated motor frequency).

F06. 0 1	Torque boost	
	0.1% ～ 30.0%	Model settings
F06. 0 2	Torque boost cut-off frequency	
	0.00Hz ~ Maximum frequency	50.00Hz

In order to compensate for the low-frequency torque characteristics, the output voltage can be compensated for. When this function code is set to 0.0 %, it is automatic torque boost. When it is set to any value other than 0.0%, it is manual torque boost. F06.02

defines the boost cutoff frequency point fz during manual torque boost, as shown in Figure F06-1.



Vb - manual torque boost

Figure F06-1 Torque boost diagram

F06. 0 3	Multi-point VF frequency point F1	
	0.00Hz ～ F06.05	0.00Hz
F06. 04	Multi-point VF voltage point V1	
	0.0% ～ 100.0%	0.0%
F06. 05	Multi-point VF frequency point F2	
	F06.03 to F06.07	0.00Hz
F06. 06	Multi-point VF voltage point V2	
	0.0% ～ 100.0%	0.0%
F06. 0 7	Multi-point VF frequency point F3	
	F06.05 ~ Motor rated frequency (F03.04)	0.00Hz
F06. 0 8	Multi-point VF voltage point V3	
	0.0% ～ 100.0%	0.0%

The six parameters F06.03 to F06.08 define the multi-segment V/F curve; the multi-point V/F curve should be set according to the load characteristics of the motor. It should be noted that the relationship between the three voltage points and the frequency points must meet the following conditions: V1 < V2 < V3, F1 < F2 < F3. Figure F06-2 is a schematic diagram of the setting of the multi-point VF curve. If the voltage is set too high at low frequency, the motor may overheat or even burn, and the inverter may lose speed or overcurrent protection due to overcurrent.

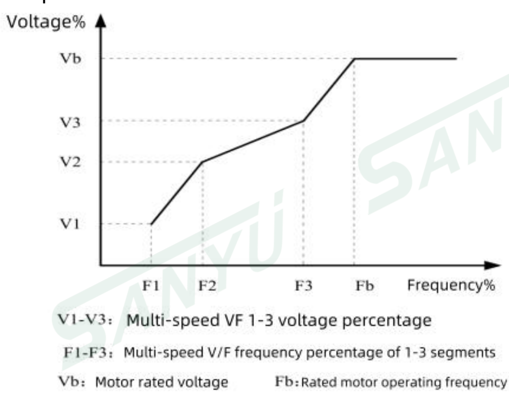


Figure F06-2 Schematic diagram of multi-point V/F curve setting

F06. 0 9	VF slip compensation gain	
	0.0% ～ 200.0%	0.0%

This parameter is only valid for asynchronous motors; VF slip compensation can compensate for the motor speed deviation caused by the asynchronous motor when the load increases, so that the motor speed can basically remain stable when the load changes. The VF slip compensation gain is set to 100.0%, which means that the slip compensated when the motor is at rated load is the rated slip of the motor, and the rated slip of the motor is calculated by the inverter through the rated frequency and rated speed of the motor in group F03. When adjusting the VF slip compensation gain, the principle is generally that the motor speed is basically the same as the target speed under rated load. When the motor speed is different from the target value, the gain needs to be fine-tuned appropriately.

F06.10	VF overexcitation gain	
	0 ～ 200	64

During the deceleration process of the inverter, overexcitation control can suppress the rise of bus voltage and avoid overvoltage faults. The larger the overexcitation gain, the stronger the suppression effect. For situations where the inverter is prone to overvoltage alarm during deceleration, it is necessary to increase the overexcitation gain. However, if the overexcitation gain is too large, it is easy to increase the output current, which needs to be weighed in the application. For situations with very small inertia, there will be no voltage rise during motor deceleration, so it is recommended to set the overexcitation gain to 0; for situations with brake resistors, it is also recommended to set the overexcitation gain to 0.

F06.11	VF oscillation suppression gain	
	0 ～ 100	Model

The method of selecting this gain is to minimize it under the premise of effectively suppressing oscillation, so as to avoid adverse effects on VF operation. When the motor has no oscillation, select this gain as 0. Only when the motor oscillates obviously, do you need to increase this gain appropriately. The larger the gain, the more obvious the suppression of oscillation. When using the oscillation suppression function, the motor rated current and no-load current parameters must be accurate, otherwise the VF oscillation suppression effect will not be good.

F06.12	reserve	
	reserve	0
F06.13	VF separated voltage source	
	0 to 8	0

0: Digital setting (F 06.14)

The voltage is set directly by F 06.14 .

1: AI1
2: AI2
The voltages 1 to 2 are determined by the analog input terminals.
3: Panel potentiometer
The voltage setting is given by the panel potentiometer.
4. PULSE setting (X7)
The voltage setting is given through terminal pulses.
5. Multi-segment instructions
When the voltage source is a multi-segment instruction, it is necessary to set the parameters of group F07 and group F10 to determine the corresponding relationship between the given signal and the given voltage. The 100.0% given by the multi-segment instruction of group F10 parameters refers to the percentage relative to the rated voltage of the motor.
6. Simple PLC
When the voltage source is a simple PLC, you need to set the F10 group parameters to determine the given output voltage.
7.PID
Generate output voltage according to PID closed loop. For details, refer to the PID introduction of group F09.
8. Communication setting

It refers to the voltage given by the host computer through communication.

The VF separation voltage source selection is similar to the frequency source selection. Please refer to the introduction of F00.03 main frequency source selection. Among them, the 100.0% of the corresponding setting of each selection refers to the rated voltage of the motor (take the absolute value of the corresponding setting value).

F06.14	Digital setting of voltage for VF separation	
	0V ~ Motor rated voltage	0V
F06.15	Voltage acceleration time for VF separation	
	0.0s ～ 1000.0s	0.0s
F06.16	Voltage deceleration time for VF separation	
	0.0s ～ 1000.0s	0.0s

The voltage acceleration time of VF separation refers to the time required for the output voltage to accelerate from 0 to the rated voltage of the motor, see t1 in Figure F06-3; the voltage deceleration time of VF separation refers to the time required for the output voltage to decelerate from the rated voltage of the motor to 0, see t2 in Figure F06-3.

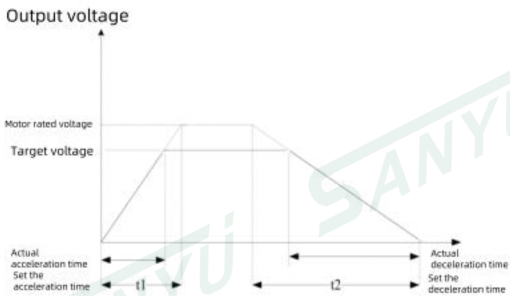


Figure F 06 - 3 V/F separation diagram

F06.17	VF separation shutdown mode selection	
	0 to 1	0

0: Frequency/voltage minus 0 independently
The VF separation output voltage decreases to 0V according to the voltage drop time (F06.16), and the VF separation output frequency decreases to 0Hz according to the deceleration time (F00.18) at the same time.
1: After the voltage is reduced to 0, the frequency is further reduced.
The VF separation output voltage decreases to 0V according to the voltage drop time (F06.16), and the frequency decreases to 0Hz according to the deceleration time (F00.18).

F06.18	VF over-current stall action current	
	50～ 200%	150%

The current that starts the overcurrent stall suppression action.

F06.19	VF overcurrent stall enable	
	0～1	1

0: Invalid
1: Valid

F06.20	VF overcurrent stall suppression gain	
	0～ 100	20

If the current exceeds the over-current stall current point, the over-current stall suppression will take effect and the actual acceleration time will automatically be extended.

F06.21	VF speed-up over-current stall current compensation coefficient	
	50～ 200%	50 %

Reduce the high-speed overcurrent overcurrent action current. It is invalid when the compensation coefficient is 50. The weak magnetic area action current corresponds to F06.18.

F06.22	VF overvoltage stall action voltage	
	200.0～ 2000.0	760.0
F06.23	VF overvoltage stall enable	
	0～ 1	1

0: Invalid
1: Valid

F06.24	VF overvoltage stall suppression frequency gain	
	0～100	30
F06.25	VF overvoltage stall suppression voltage gain	
	0～100	30

Increasing F06.24 will improve the control effect of bus voltage, but the output frequency will fluctuate. If the output frequency fluctuates greatly, F06.24 can be appropriately reduced. Increasing F06.25 can reduce the overshoot of bus voltage.

F06.26	Overvoltage stall maximum rising limit frequency	
	0～50Hz	5 Hz

Overvoltage suppression maximum rising frequency limit.

F 07 Group - Input Terminals

F07. 00	Input terminal X1 function (when F00.00 is 1 or 2, the default is function 53)	
	0～58	1
F07. 01	Input terminal X2 function (when F00.00 is 1 or 2, the default is function 54)	
	0～58	2
F07. 02	Input terminal X3 function (when F00.00 is 1 or 2, the default is function 55)	
	0～58	9
F07. 03	Input terminal X4 function (when F00.00 is 1 or 2, the default is function 56)	
	0～58	12
F07. 04	Input terminal X5 function (when F00.00 is 1 or 2, the default is function 57)	
	0～58	13
F07. 05	Input terminal X6 function (when F00.00 is 1 or 2, the default is function 58)	
	0～58	0
F07. 06	Input terminal X7 function (high-speed pulse input)	
	0～58	30
F07.07 ～ F07.09	reserve	
	—	0

0: No function
1: Forward operation (FWD)
The terminal is short-circuited with COM, and the inverter runs forward. This is only valid when F00.02 = 1 .
2: Reverse operation (REV)
The terminal is short-circuited with COM, and the inverter runs in reverse direction. This is only valid when F00.02 = 1 .
3: Three-wire operation control
the functional description of operation modes 2 and 3 (three-wire control modes 1 and 2) of F07.11 .
4: Forward jog (FJOG)
The terminal is short-circuited with COM, and the inverter will jog forward. This is only valid when F00.02 = 1 .
5: Reverse jog (RJOG)
The terminal is short-circuited with COM, and the inverter will jog in reverse direction. This is only valid when F00.02 = 1 .
6 : Terminal UP
7 : Terminal DOWN
When the frequency is given by the external terminal, the frequency increment and decrement instructions are modified. When the frequency source is set to digital setting, the set frequency can be adjusted up and down.
8: Free stop
This function has the same meaning as the free-run stop defined in F01.10, but it is implemented using control terminals for the convenience of remote control.
9: Fault reset (RESET)

The function of using the terminal to reset the fault is the same as the function of the RESET key on the keyboard. This function can be used to achieve remote fault reset.

10: Operation paused

The inverter decelerates to stop, but all operating parameters are memorized, such as PLC parameters, swing frequency parameters, and PID parameters. After this terminal signal disappears, the inverter returns to the operating state before stopping.

11: External fault normally open input

When the signal is sent to the inverter, the inverter reports fault E-15 and performs fault processing according to the fault protection action mode (for details, refer to function code F12.47).

12: Multi-speed selection 1

13: Multi-speed selection 2

14: Multi-speed selection 3

15: Multi-speed selection 4

ON/OFF combination of these functional terminals , up to 16 speeds can be selected . The details are shown in the following table:

Multi-speed selection SS4	Multi-speed Choose SS3	Multi-speed Choose SS2	Multi-speed Choose SS1	Speed
OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	ON	1
OFF	OFF	ON	OFF	2
OFF	OFF	ON	ON	3
OFF	ON	OFF	OFF	4
OFF	ON	OFF	ON	5
OFF	ON	ON	OFF	6
OFF	ON	ON	ON	7
ON	OFF	OFF	OFF	8
ON	OFF	OFF	ON	9
ON	OFF	ON	OFF	10
ON	OFF	ON	ON	11
ON	ON	OFF	OFF	12
ON	ON	OFF	ON	13
ON	ON	ON	OFF	14
ON	ON	ON	ON	15

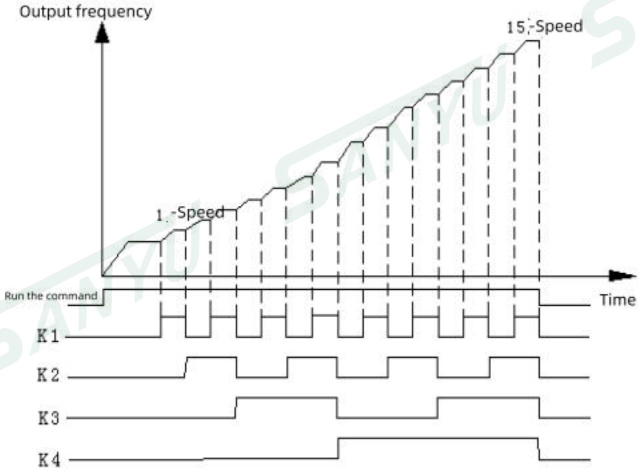


Figure F07-1 Schematic diagram of multi-speed operation

16: Acceleration/deceleration time selection terminal 1
17: Acceleration/deceleration time selection terminal 2
ON/OFF combination of these function terminals , up to 4 acceleration and deceleration times can be selected. The details are shown in the following table:

Acceleration/deceleration time selection terminal 2	Acceleration/deceleration time selection terminal 1	Acceleration or deceleration time selection
OFF	OFF	Acceleration time 1/ Deceleration time 1
OFF	ON	Acceleration time 2 / Deceleration time 2
ON	OFF	Acceleration time 3 / Deceleration time 3
ON	ON	Acceleration time 4 / Deceleration time 4

18 : Frequency source switching
Used to switch between different frequency sources; according to the setting of the frequency source selection function code (F00.07), when two frequency sources are set as the frequency source, this terminal is used to switch between the two frequency sources.
19: UP/DOWN setting clear (terminal, keyboard)
When the frequency setting is digital frequency setting, this terminal can clear the frequency value changed by terminal UP/DOWN or keyboard UP/DOWN, so that the given frequency returns to the value set by F00.08.
20: Control command switching terminal 1
When the command source is set to terminal control (F00.02=1), this terminal can be used to switch between terminal control and keyboard control; when the command source is set to communication control (F00.02=2), this terminal can be used to switch between communication control and keyboard control.
21: Acceleration and deceleration prohibited

Ensure that the inverter is not affected by external signals (except stop commands) and maintains the current output frequency.

22: PID pause

PID is temporarily invalid, the inverter maintains the current output frequency, and no longer performs PID adjustment of the frequency source.

23: PLC status reset

When the PLC is paused during execution and runs again, this terminal can be used to restore the inverter to the initial state of the simple PLC.

24: Swing frequency pause

The inverter outputs at the center frequency. The swing frequency function is paused.

25: Counter input

Input terminal for counting pulses.

26: Counter reset

Clear the counter status.

27: Length count input

Input terminal for length counting.

28: Length reset

The length is cleared to zero.

29: Torque control disabled

The inverter is prohibited from performing torque control and enters speed control mode.

30: PULSE frequency input (valid only for X7)

X7 functions as a pulse input terminal.

31: Reserved

32: Immediate DC braking

When this terminal is valid, the inverter directly switches to DC braking state.

33: External fault normally closed input

When the external fault normally closed signal is sent to the inverter, the inverter reports fault E-15 and shuts down.

34: Frequency modification prohibited

If this function is set to be valid, when the frequency changes, the inverter will not respond to the frequency change until the terminal status is valid.

35 : PID action direction is reversed

When this terminal is valid, the PID action direction is opposite to the direction set by F09.03.

36: External parking terminal 1

When controlled by keyboard, this terminal can be used to stop the inverter, which is equivalent to the function of the STOP key on the keyboard.

37: Control command switching terminal 2

Used to switch between terminal control and communication control; if the command source is selected as terminal control, the system switches to communication control when the terminal is valid; and vice versa.

38: PID integration pause

When this terminal is valid, the integral adjustment function of PID is suspended, but the proportional adjustment and differential adjustment functions of PID are still valid.

39: Switch between frequency source A and preset frequency

If this terminal is valid, frequency source A is replaced by the preset frequency (F00.08).

40: Switch between frequency source B and preset frequency

If this terminal is valid, frequency source B is replaced by the preset frequency (F00.08).

41-42: Reserved

43: PID parameter switching

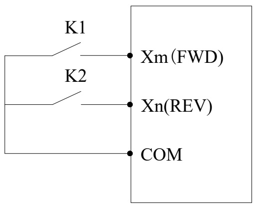
When the PID parameter switching condition is X terminal (F09.18=1), when the terminal is invalid, the PID parameters use F09.05 ~ F09.07; when the terminal is valid, F09.15 ~ F09.17 are used.
44: User-defined fault 1
45: User-defined fault 2
When user-defined faults 1 and 2 are valid, the inverter alarms E-27 and E-28 respectively, and the inverter will process according to the action mode selected by F12.49 according to the fault protection action selection.
46: Speed control/torque control switch
The inverter switches between torque control and speed control mode. When this terminal is invalid, the inverter runs in the mode defined by F05.00 (speed/torque control mode). When this terminal is valid, it switches to another mode.
47: Emergency Stop
When this terminal is valid, the inverter stops at the fastest speed, and the current during the stopping process is within the set current upper limit. This function is used to meet the requirement that the inverter needs to stop as soon as possible when the system is in an emergency state.
48: External parking terminal 2
In any control mode (panel control, terminal control, communication control), this terminal can be used to decelerate the inverter to stop. At this time, the deceleration time is fixed to deceleration time 4.
49: Deceleration DC braking
When this terminal is valid, the inverter first decelerates to the shutdown DC braking starting frequency, and then switches to the DC braking state.
50: This running time is reset
When this terminal is valid, the timing time of the inverter's current operation is cleared. This function needs to be used in conjunction with the timing operation (F02.42) and the current operation time arrival (F02.53).
51: Two-wire/three-wire switching
Used to switch between two-wire and three-wire control; if F07.11 is two-wire 1, this terminal function will switch to three-wire 1 when it is valid; and so on.
52: Reverse is prohibited
When this terminal is valid, only forward operation is performed.
53: Start/Stop (x1)
When this terminal is valid, the frequency is given by AI1, PID control is not performed , and it is controlled by the interlocking signal. The interlocking signal that is activated first will start first, and the ones that are activated together will start later.
54: Operation allowed (X2)
This terminal is used to control the start and stop of the inverter, and is generally connected to external water shortage or high voltage signal control.
55: Interlock 1 (X3)
After this terminal is connected, the corresponding open collector R1 output.
56: Interlock 2 (X4)
After this terminal is connected, the corresponding open collector R2 output.
57: Interlock 3 (X5)
After this terminal is connected, the corresponding relay Y1 output.
58: PFC start/stop (X6)
When this terminal is valid, PID control is carried out and it is controlled by the interlocking signal. The one that is put into operation first will start first, and the ones that are put into operation together will start later.

F07.10	X filter time	
	0.000s ～ 1.000s	0.010s

Set the software filter time of the X terminal state. If the input terminal is easily disturbed and causes malfunction.
To enhance the anti-interference ability. However, the increase of filtering time will cause the response of X-terminal to slow down.

F07.11	Terminal command mode	
	0～3	0

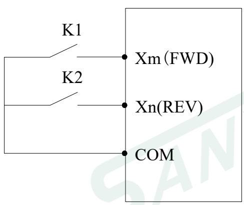
This function code defines four different ways to control the operation of the inverter through external terminals.
0: Two-wire 1
Xm: forward command (FWD), Xn: reverse command (REV), Xm, Xn represent any two terminals defined as FWD, REV functions in X1~X7. In this control mode, K1 and K2 can independently control the operation and direction of the inverter.



K2	K1	Run the command
0	0	Stop
0	1	Forward rotation
1	0	Stop
1	1	rollback

Figure F07-2 Schematic diagram of two-wire control mode 1

1: Two-wire type 2
Xm: forward command (FWD), Xn: reverse command (REV), Xm, Xn represent any two terminals defined as FWD, REV functions in X1~X7. In this control mode, K1 is the run/stop switch, and K2 is the direction switch.



K2	K1	Run the command
0	0	Stop
0	1	Forward rotation
1	0	Stop
1	1	rollback

Figure F07-3 Schematic diagram of two-wire control mode 2

2: Three-wire 1

Xm: forward command (FWD), Xn: reverse command (REV), Xx: stop command, Xm, Xn, Xx represent any three terminals defined as FWD, REV, and three-wire operation control functions in X1~X7. Before K3 is connected, the connected K1 and K2 are invalid. When K3 is connected, trigger K1, the inverter runs forward; trigger K2, the inverter reverses; disconnect K3, the inverter stops.

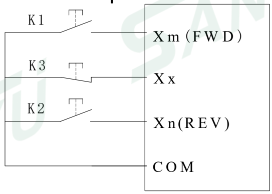
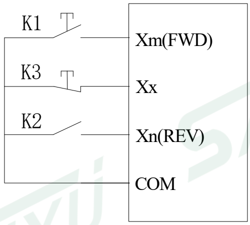


Figure F07-4 Schematic diagram of three-wire control mode 1

3: Three-wire 2

Xm: Run command, Xn: Run direction selection, Xx: Stop command, Xm, Xn, Xx represent any three terminals defined as FWD, REV, and three-wire operation control functions in X1-X7. Before K3 is connected, the connected K1 and K2 are invalid. When K3 is connected, K1 is triggered and the inverter runs forward; triggering K2 alone is invalid; after K1 triggers the operation, K2 is triggered again, and the inverter runs in the same direction; disconnecting K3 stops the inverter.



K2	K1	Run the command
0	0	Stop
0	1	Forward rotation
1	0	rollback
1	1	Stop

Figure F07-5 Schematic diagram of three-wire control mode 2

⚠**Notice:**

When the three-wire control mode 2 is running forward, the terminal defined as REV must be closed for a long time to ensure stable reverse rotation, and it will return to forward rotation when disconnected.

F07. 12	Terminal UP/DOWN change rate	
	0.001Hz/s ～ 65.535Hz/s	1.0 0 0Hz/s

It is used to set the speed of frequency change when the terminal UP/DOWN adjusts the set frequency, that is, the frequency change per second; when F00.22 (frequency decimal point) is 2, the value range is 0.001Hz/s ~ 65.535Hz/s; when F00.22 (frequency decimal point) is 1, the value range is 0.01Hz/s ~ 655.35Hz/s.

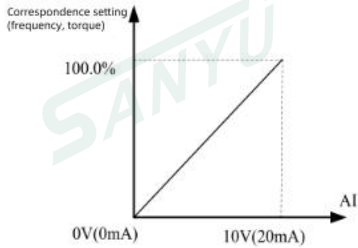
F07.13	AI curve 1 minimum input	
	0.00V ～ F07.15	0.00V
F07.14	AI curve 1 minimum input corresponding setting	
	-100.00% ～ 100.0%	0.0%

F07.15	AI curve 1 maximum input	
	F07.13 ～ 10.00V	10.00V
F07.16	AI curve 1 maximum input corresponding setting	
	-100.00% ～ +150.0%	100.0%
F07.17	AI 1 filter time	
	0.00s ～ 10.00s	0.10s

The above function codes are used to set the relationship between the analog input voltage and the set value it represents; when the analog input voltage is greater than the set "maximum input" (F07.15), the analog voltage is calculated according to the "maximum input"; similarly, when the analog input voltage is less than the set "minimum input" (F07.13), it is calculated according to the setting of "AI lower than minimum input setting selection" (F07.34) with minimum input or 0.0%. When the analog input is current input, 1mA current is equivalent to 0.5V voltage.

AI1 input filter time is used to set the software filter time of AI1. When the analog quantity on site is easily disturbed, please increase the filter time to make the detected analog quantity tend to be stable. However, the longer the filter time is, the slower the response speed to the analog quantity detection will be. How to set it needs to be weighed according to the actual application situation.

In different applications, the meaning of the nominal value corresponding to 100.0% of the analog setting is different. Please refer to the instructions of each application section for details. The following illustrations show two typical settings:



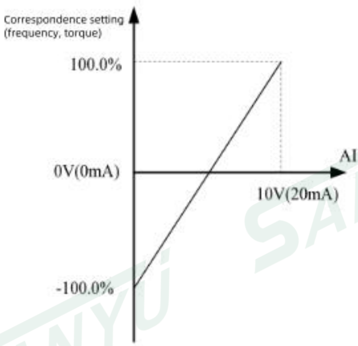


Figure F07-6 Correspondence between analog reference and set value

F07.18	AI curve 2 minimum input	
	0.00V ～ F07.20	0.00V

F07.19	AI curve 2 minimum input corresponding setting	
	-100.00% ～ 100.0%	0.0%
F07.20	AI curve 2 maximum input	
	F07.18 ～ 10.00V	10.00V
F07.21	AI curve 2 maximum input corresponding setting	
	-100.00% ～+150.0%	100.0%
F07.22	AI 2 filter time	
	0.00s ～ 10.00s	0.10s
F07.23	Panel potentiometer minimum input	
	0.00V ～ F07.25	0.00V
F07.24	Panel potentiometer minimum input corresponding setting	
	-100.00% ～ 100.0%	0.0%
F07.25	Panel potentiometer maximum input	
	F07.23～10.00V	10.00V
F07.26	Panel potentiometer maximum input corresponding setting	
	-100.00% ～+150.0%	100.0%
F07.27	Panel potentiometer filter time	
	0.00s ～ 10.00s	0.10s

Curve 2: For the function and usage of the panel potentiometer, please refer to the description of Curve 1.

F07.28	PULSE minimum input	
	0.00kHz～F4-30	0.00kHz
F07.29	PULSE minimum input corresponding setting	
	-100.00% ～ 100.0%	0.0%
F07.30	PULSE maximum input	
	F4-28 ～ 50.00kHz	50.00kHz
F07.31	PULSE maximum input corresponding setting	
	-100.00% ～ 100.0%	100.0%
F07.32	PULSE filter time	
	0.00s ～ 10.00s	0.10s

This group of function codes is used to set the relationship between the X7 pulse frequency and the corresponding setting; the pulse frequency can only be input into the inverter through the X7 channel. The application of this group of functions is similar to curve 1, please refer to the description of curve 1.

F07.33	AI curve selection	
	0000～0355	321

Units: AI1 curve selection
1: Curve 1 (2 points, see F07.13 ~ F07.16)
2: Curve 2 (2 points, see F07.18 ~ F07.21)
3: Curve 3 (2 points, see F07.23 ~ F07.26)
4: Curve 4 (4 points, see F18.00 ~ F18.07)
5: Curve 5 (4 points, see F18.08 ~ F18.15)
Tens digit: AI2 curve selection (1 to 5, same as above)
Hundreds and thousands: reserved
The ones and tens of this function code are used to select the setting curves corresponding to analog input AI1, AI2, and panel potentiometer. Analog input AI1 and AI2 can select any one of the five curves. Curve 1, curve 2, and panel potentiometer are

all 2-point curves, which are set in the F07 group function code, while curve 4 and curve 5 are both 4-point curves, which need to be set in the F18 group function code.

F07.34	AI below minimum input setting selection	
	0000～0111	0000

Units: AI1 is lower than the minimum input setting selection
0: corresponds to the minimum input setting
1:0.0%
Tens place: AI2 is lower than the minimum input setting selection (0 ~ 1, same as above)
Hundreds place: Panel potentiometer is lower than the minimum input setting selection (0 ~ 1, same as above)
Thousands: Reserved
This function code is used to set how to determine the setting corresponding to the analog quantity when the voltage of the analog quantity input is less than the set "minimum input";
The ones, tens and hundreds of this function code correspond to analog input AI1, AI2 and panel potentiometer respectively; if 0 is selected, when AI input is lower than "minimum input", the setting corresponding to the analog quantity is the curve "minimum input corresponding setting" (F07.14, F07.19, F07.24) determined by the function code. If 1 is selected, when AI input is lower than minimum input, the setting corresponding to the analog quantity is 0.0%.

F07.35	X 1 delay time	
	0.0s ～ 3600.0s	0.0s
F07.36	X2 Delay Time	
	0.0s ～ 3600.0s	0.0s
F07.37	X3 Delay Time	
	0.0s ～ 3600.0s	0.0s

It is used to set the delay time of the inverter when the state of the DI terminal changes. Currently, only X1, X2, and X3 have the function of setting the delay time.

F07.38	X terminal effective mode selection 1	
	00000 ～ 11111	00000

Units: X1 terminal effective status setting
0: Low level is valid
1: High level is valid
Tens digit: X2 terminal effective status setting (0 ~ 1, same as above)
Hundreds place: X3 terminal effective state setting (0 ~ 1, same as above)
Thousands digit: X4 terminal effective status setting (0 to 1, same as above)
Ten thousand digit: X5 terminal effective status setting (0 ~ 1, same as above)

Used to set the effective state mode of the digital input terminal. When high level is selected as effective, the corresponding X terminal is effective when connected to COM, and is invalid when disconnected; when low level is selected as effective, the corresponding X terminal is invalid when connected to COM, and is effective when disconnected.

F07.39	X terminal effective mode selection 2	
	00000 ～ 00011	00000

Units: X6 terminal effective status setting
0: Low level is valid
1: High level is valid

Tens digit: X7 terminal effective status setting (0 ~ 1, same as above)
Hundreds, thousands, and ten thousand: reserved
For settings, refer to F07.38 instructions.

F07.40	reserve	
	reserve	0
F07.41	AI1 input anti-shake coefficient	
	0 ～ 1000	0
F07.42	AI 2 input anti-shake coefficient	
	0 ～ 1000	0

F 08 Group - **Output Terminals**

F08.00	DO terminal output mode selection	
	0～1	0

0: Pulse output (DOP)
1: Switching output (DOR)
Both DOP and DOR are output through the main control board terminal DO.

F08.01	DOR output function selection	
	0～ 44	0
F08.02	Control board relay R1 function selection	
	0～ 44	3
F08.03	Control board relay R2 function selection	
	0～ 44	0
F08.04	Open collector Y1 output function selection	
	0～ 44	0
F08.05	Open collector Y2 output function selection	
	0～ 44	0

0 : No output
1 : The inverter is running
Indicates that the inverter is in operation, has an output frequency (can be zero), and outputs an ON signal.
2: Fault output (fault shutdown)
When the inverter fails and stops, it outputs an ON signal.
3: Frequency level detection FDT1 output
Please refer to the description of function code F02.19 and F02.20.
4: Frequency arrival
Please refer to the description of function code F02.21.
5: Zero speed operation (no output when stopped)
When the inverter is running and the output frequency is 0, it outputs an ON signal. When the inverter is in the stopped state, the signal is OFF.
6: Motor overload warning
Before the motor overload protection is activated, it is judged according to the overload pre-alarm threshold, and the ON signal is output after exceeding the pre-alarm threshold. For the motor overload parameter setting, refer to function code F12.00 ~ F12.02.
7: Inverter overload warning
10s before the inverter overload protection occurs, the output is ON signal.
8: Set count value reached
When the count value reaches the value set by F11.08, an ON signal is output.
9: The specified count value has been reached

When the count value reaches the value set by F11.09, an ON signal is output. For the count function, refer to the F11 group function description.
10: Length reached
When the actual length detected exceeds the length set by F11.05, an ON signal is output.
11: PLC cycle completed
When the simple PLC completes a cycle, it outputs a pulse signal with a width of 250ms.
12: Accumulated running time reached
When the inverter's cumulative running time exceeds the time set in F02.17, it outputs an ON signal.
13: Frequency limited
When the set frequency exceeds the upper or lower frequency limit, and the inverter output frequency also reaches the upper or lower frequency limit, an ON signal is output.
14: Torque limited
When the inverter is in speed control mode and the output torque reaches the torque limit value, the inverter is in stall protection state and outputs ON signal.
15: Ready to run
When the power supply of the inverter main circuit and control circuit has stabilized, and the inverter has not detected any fault information, and the inverter is in an operational state, it outputs an ON signal.
16: AI1 > AI2
When the analog input AI1 value is greater than the input value of AI2, an ON signal is output.
17: Upper frequency limit reached
When the operating frequency reaches the upper limit frequency, an ON signal is output.
18: Lower frequency limit reached (no output during shutdown)
When the operating frequency reaches the lower limit frequency, the ON signal is output. The signal is OFF in the stop state.
19: Undervoltage status output
When the inverter is in undervoltage state, it outputs ON signal.
20: Communication settings
Please refer to Communication Protocol.
21: Reserved
22: Reserved
23: Zero speed running 2 (also output when stopped)
When the inverter output frequency is 0, it outputs an ON signal. This signal is also ON in the stop state.
24: Accumulated power-on time has expired
When the inverter's cumulative power-on time (F14.11) exceeds the time set by F02.16, it outputs an ON signal.
25: Frequency level detection FDT2 output
Please refer to the description of function code F02.28 and F02.29.
26: Frequency 1 reaches output
Please refer to the description of function code F02.30 and F02.31.
27: Frequency 2 reaches output
Please refer to the description of function code F02.32 and F02.33.
28: Current 1 reaches the output
Please refer to the description of function code F02.38 and F02.39.
29: Current 2 reaches the output
Please refer to the description of function code F02.40 and F02.41.
30: Timing arrival output

When the timing function selection (F02.42) is valid, the inverter will output ON signal after the current running time reaches the set timing time.
31: AI1 input exceeds limit
When the value of analog input AI1 is greater than F02.44 (AI1 input protection upper limit) or less than F02.43 (AI1 input protection lower limit), an ON signal is output.
32: Downloading
When the inverter is in the off-load state, it outputs ON signal.
33: Reverse running
When the inverter is in reverse operation, it outputs an ON signal
34: Zero current state
Please refer to the description of function code F02.32 and F02.33
35: Module temperature reaches
When the inverter module heat sink temperature (F14.08) reaches the set module temperature reaching value (F02.45), the output is ON signal
36: Software current exceeds limit
Please refer to the description of function code F02.34 and F02.35.
37: Lower frequency limit reached (output even when stopped)
When the operating frequency reaches the lower limit frequency, the ON signal is output. This signal is also ON in the stop state.
38: Alarm output
When a fault occurs in the inverter and the fault handling mode is to continue running, the inverter will output an alarm.
39: Motor overtemperature alarm
When the motor temperature reaches F12.58 (motor overheat pre-alarm threshold), the ON signal is output. (The motor temperature can be checked through d00.34)
40: This running time has expired
When the inverter starts running for longer than the time set by F02.51, it will output an ON signal.
41: Fault output (free stop fault and no output due to undervoltage)
42: Interlock 1 output
43: Interlock 2 output
44: Interlock 3 output
For details of 42-44, please see Appendix 3 (Water Supply Instructions).

F08.06	DOP output function selection	
	0-16	0
F08.07	AO1 output function selection	
	0-16	0
F08.08	AO2 output function selection	
	0-16	1

The output range of analog output AO1 and AO2 is 0V ~ 10V, or 0mA ~ 20mA, and the calibration relationship with the corresponding function is shown in the following table:

Settings	Function	corresponding to pulse or analog output 0.0% to 100.0%)
0	Operating frequency	0～ Maximum output frequency
1	Setting frequency	0～ Maximum output frequency
2	Output current	0 to 2 times the rated current of the motor
3	Output torque (absolute value)	0 to 2 times the rated torque of the motor
4	Output Power	0 to 2 times rated power
5	The output voltage	0 to 1.2 times the rated voltage of the inverter

6	PULSE input	0.01kHz ～ 100.00kHz
7	AI1	0V ~ 10V (or 0 ~ 20mA)
8	AI2	0V ~ 10V
9	Panel potentiometer	0V ~ 10V
10	length	0 to maximum setting length
11	Count value	0 to maximum count value
12	Communication Settings	0.0% ～ 100.0%
13	Motor speed	0 ~ Speed corresponding to the maximum output frequency
14	Output current	0.0A ～ 1000.0A
15	The output voltage	0.0V ～ 1000.0V
16	Output torque (actual value)	-2 times the motor rated torque ~ 2 times the motor rated torque

F08. 0 9	DOP output maximum frequency	
	0.01KHz～100.00KHz	50.00KHz
F08.10	AO 1 bias coefficient	
	-100.0% ～ +100.0%	0.0%
F08.11	AO1 Gain	
	-10.00 ～ +10.00	1.00
F08.12	AO2 bias coefficient	
	-100.0% ～ +100.0%	0.00%
F08.13	AO2 Gain	
	-10.00 ～ +10.00	1.00

The above function codes are generally used to correct the zero drift of analog output and the deviation of output amplitude, and can also be used to customize the required AO output curve; if the zero bias is represented by "b", the gain is represented by k, the actual output is represented by Y, and the standard output is represented by X, then the actual output is: Y=kX+b.
Among them, the zero bias coefficient of AO1 and AO2 is 100% corresponding to 10V (or 20mA), and the standard output refers to the output of 0V~10V (or 0mA~20mA) corresponding to the analog output without zero bias and gain correction. For example: if the analog output content is the operating frequency, it is hoped that the output is 8V when the frequency is 0 and 3V when the frequency is the maximum frequency, then the gain should be set to "-0.50" and the zero bias should be set to "80%".

F08.14 ～ F08.16	reserve	
	reserve	0
F08.17	DOR output delay time	
	0.0s ～ 3600.0s	0.0s
F08.18	R1 output delay time	
	0.0s ～ 3600.0s	0.0s
F08.19	R2 output delay time	
	0.0s ～ 3600.0s	0.0s
F08.20	Y1 output delay time	
	0.0s ～ 3600.0s	0.0s

F08.21	reserve	
	reserve	0

Set the delay time from the state change of DOP, relay R1, relay R2 and Y1 to the actual output change.

F08.22	Output terminal effective state selection	
	00000 ～ 11111	00000

Units: Reserved
Tens: R1 effective state setting
0: High level is valid
1: Low level is valid
Hundreds place: R2 effective state setting (0 ~ 1, same as above)
Thousands place: Y1 effective state setting (0 ~ 1, same as above)
Ten thousand digit: reserved
Define the output logic of relay R1, relay R2 and Y1.
0: Positive logic, the digital output terminal and the corresponding common terminal are connected for a valid state, and disconnected for an invalid state;
1: Inverse logic, the digital output terminal and the corresponding common terminal are connected for invalid state, and disconnected for valid state.

F08.23	AO1 output signal selection	
	0 to 1	0

0: Voltage signal
1: Current signal
AO1 supports voltage/current signal output, which needs to be selected through jumpers. When the jumper selection is voltage or current, F08.23 needs to be set accordingly.

F 09 Group - **PID Function**

F09.00	PID given source	
	0～7	0

0 : F 09.01 setting
1 : AI1
2 : AI2
3 : Panel potentiometer
4 : PULSE (X7)
5 : Communication
6 : Multi-segment instructions
This parameter is used to select the target value given channel of process PID.
7: Pressure setting (MPa, Kg)

F09.01	PID value given	
	0.0% ～ 100.0%	50.0%

The set target quantity of process PID is a relative value, and the setting range is 0.0% to 100.0%. Similarly, the feedback quantity of PID is also a relative quantity, and the function of PID is to make these two relative quantities the same.

F09.02	PID feedback source	
	0～8	0

0 : AI1

1 : AI2
2 : Panel potentiometer
3 : AI1-AI2
4 : PULSE (X7)
5 : Communication
6 : AI1+AI2
7 : MAX(|AI1|,|AI2|)
8 : MIN (|AI1|,|AI2|)

This parameter is used to select the feedback signal channel of process PID; the feedback amount of process PID is also a relative value, and the setting range is 0.0% to 100.0%.

F09.0 3	PID action direction	
	0～1	0

0 : Positive effect
When the PID feedback signal is less than the given value, the inverter output frequency increases, such as in the case of winding tension control.
1: Counteraction
When the PID feedback signal is less than the given value, the inverter output frequency decreases, such as in the case of unwinding tension control.
This function is affected by the inversion of the PID action direction of the multi-function terminal (function 35), so please be careful when using it.

F09.0 4	PID given feedback range	
	0 ~ 65535	1000

PID given feedback range is a dimensionless unit, used for PID given display d00.15 and PID feedback display d00.16. The relative value of PID given feedback is 100.0%, corresponding to the given feedback range F09.04. For example, if F09.04 is set to 2000, when the PID given is 100.0%, the PID given display d00.15 is 2000.

F09.05	Proportional gain Kp1	
	0.0 ～ 999.9	20.0
F09.06	Integration time Ti1	
	0.01s ～ 10.00s	2.00s
F09.07	Derivative time Td1	
	0.00 ～ 10.000	0.000s

Proportional gain Kp1:
Determines the regulation strength of the entire PID regulator. The larger the Kp1, the greater the regulation strength. This parameter is 100.0, which means that when the deviation between the PID feedback and the given amount is 100.0%, the regulation amplitude of the PID regulator on the output frequency command is the maximum frequency.
Integration time Ti1:
Determines the strength of the integral adjustment of the PID regulator. The shorter the integral time, the greater the adjustment strength. The integral time refers to the time when the deviation between the PID feedback and the given amount is 100.0%, the integral regulator continuously adjusts after this time, and the adjustment amount reaches the maximum frequency.
Derivative time Td1:
Determines the intensity of the PID regulator's regulation of the deviation change rate. The longer the differential time, the greater the regulation intensity. The differential time refers to the maximum frequency when the feedback amount changes by 100.0% within this time.

F09.08	PID reverse cut-off frequency limit	
	0.00 ~ Maximum frequency	2.00Hz

In some cases, only when the PID output frequency is negative (i.e. the inverter reverses), PID can control the given value and the feedback value to the same state. However, too high a reverse frequency is not allowed in some occasions. F09.08 is used to determine the upper limit of the reverse frequency.

F09.09	PID Deviation Limit	
	0.0% ～ 100.0%	0.0%

When the deviation between the PID given value and the feedback value is less than F09.09, the PID stops adjusting. In this way, when the deviation between the given value and the feedback value is small, the output frequency is stable and unchanged, which is very effective for some closed-loop control occasions.

F09.10	PID differential limiting	
	0.00 % ～ 100.00%	0.5 0 %

In the PID regulator, the differential effect is relatively sensitive and can easily cause system oscillation. For this reason, the PID differential effect is generally limited to a smaller range. F09.10 is used to set the range of PID differential output.

F09.11	PID given change time	
	0.00s ～ 650.00s	0.00s

PID given change time refers to the time required for the PID given value to change from 0.0% to 100.0%. When the PID given value changes, the PID given value changes linearly according to the given change time, reducing the adverse effects of sudden changes in the given value on the system.

F09.12	PID feedback filter time	
	0.00s ～ 60.00s	0.00s
F09.13	PID output filter time	
	0.0s ～ 60 0.0s	10 0.0s

F09.12 is used to filter the PID feedback. This filtering is helpful to reduce the impact of interference on the feedback, but it will reduce the response performance of the process closed-loop system. F09.13 is used to filter the PID output frequency. This filtering will weaken the sudden change of the inverter output frequency, but it will also reduce the response performance of the process closed-loop system.

F09.14	reserve	
	reserve	0
F09.15	Proportional gain Kp 2	
	0.0 ～ 999.9	20.0
F09.16	Integration time Ti 2	
	0.01s ～ 10.00s	2.00s
F09.17	Derivative time Td 2	
	0.00 ～ 10.000	0.000s

In some applications, one set of PID parameters cannot meet the requirements of the entire operation process, and different PID parameters need to be used in different situations.

This group of function codes is used to switch between two groups of PID parameters. The setting method of the regulator parameters F09.15 to F09.17 is similar to that of the parameters F09.05 to F09.07.

F09.18	PID parameter switching conditions	
	0 to 8	0

0: Do not switch
1: Switch via X terminal
2: Automatically switch according to deviation
3 to 8: Reserved

The two groups of PID parameters can be switched through the multi-function digital X terminal, or they can be switched automatically according to the PID deviation. When the multi-function X terminal is selected for switching, the multi-function terminal function selection must be set to 43 (PID parameter switching terminal). When the terminal is invalid, select parameter group 1 (F09.05~F09.07), and when the terminal is valid, select parameter group 2 (F09.15~F09.17).

F09.19	PID parameter switching deviation 1	
	0.0% ～ F09.20	20.0%
F09.20	PID parameter switching deviation 2	
	F09.19 ～ 100.0%	80.0%

When automatic switching is selected, when the absolute value of the deviation between the given and feedback is less than the PID parameter switching deviation 1 (F09.19), the PID parameters select parameter group 1. When the absolute value of the deviation between the given and feedback is greater than the PID switching deviation 2 (F09.20), the PID parameters select parameter group 2. When the deviation between the given and feedback is between the switching deviation 1 and the switching deviation 2, the PID parameters are the linear interpolation values of the two groups of PID parameters, as shown in Figure F09-1.

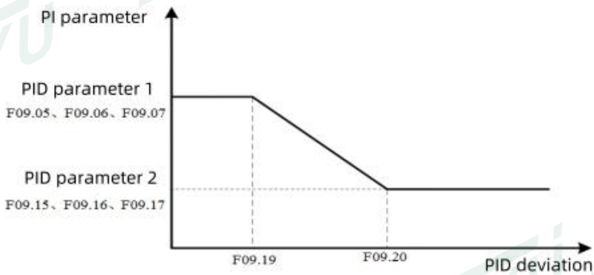


Figure F09-1 PID parameter switching

F09.21	PID initial value	
	0.0% ～ 100.0%	0.0%
F09.22	PID initial value holding time	
	0.00s ～ 650.00s	0.00s

When the inverter starts, the PID output is fixed to the PID initial value F09.21. After the PID initial value holding time F09.22 is maintained, the PID starts the closed-loop adjustment operation. Figure F09-2 is a functional diagram of the PID initial value.

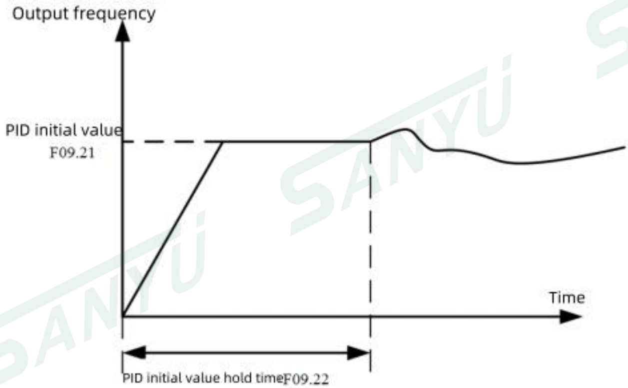


Figure F09-2 PID initial value function diagram

F09.23	reserve	
	reserve	0
F09.24	reserve	
	reserve	0
F09.25	PID feedback upper limit loss detection value	
	0.0%: Do not judge feedback loss; 0.1% ~ 100.0%	0.0%
F09.26	PID feedback lower limit loss detection value	
	0.0%: Do not judge feedback loss; 0.1% ~ 100.0%	0.0%
F09.27	PID feedback loss detection time	
	0.0s ～ 20.0s	0.0s

This function code is used to determine whether the PID feedback is lost; when the PID feedback is less than the feedback lower limit loss detection value F09.26, and greater than the feedback upper limit loss detection value F09.25, and the duration exceeds the PID feedback loss detection time F09.27, the inverter alarm fault E-31 and handles it according to the selected fault handling method.

F09.28	PID shutdown calculation	
	0 to 1	0

0: Stop and do not calculate
1: Stop operation

It is used to select whether PID continues to operate when PID is in shutdown state. In general applications, PID should stop operating when in shutdown state.

F 10 Group - Multi-segment instructions, simple PLC

F10. 0 0	Multi-segment instruction 0	
	-100.0% ～ 100.0%	0.0%
F10. 0 1	Multi-segment instruction 1	
	-100.0% ～ 100.0%	0.0%
F10. 0 2	Multi-segment instruction 2	
	-100.0% ～ 100.0%	0.0%
F10. 0 3	Multi-segment instruction 3	
	-100.0% ～ 100.0%	0.0%
F10. 0 4	Multi-segment instruction 4	

	-100.0% ～ 100.0%	0.0%
F10. 0 5	Multi-segment instruction 5	
	-100.0% ～ 100.0%	0.0%
F10. 0 6	Multi-segment instruction 6	
	-100.0% ～ 100.0%	0.0%
F10. 0 7	Multi-segment instruction 7	
	-100.0% ～ 100.0%	0.0%
F10. 0 8	Multi-segment instruction 8	
	-100.0% ～ 100.0%	0.0%
F10. 0 9	Multi-segment instruction 9	
	-100.0% ～ 100.0%	0.0%
f/10.10	Multi-segment instruction 10	
	-100.0% ～ 100.0%	0.0%
f/10.11	Multi-segment instruction 11	
	-100.0% ～ 100.0%	0.0%
f/10.12	Multi-segment instruction 12	
	-100.0% ～ 100.0%	0.0%
f/10.13	Multi-segment instruction 13	
	-100.0% ～ 100.0%	0.0%
f/10.14	Multi-segment instruction 14	
	-100.0% ～ 100.0%	0.0%
f/10.15	Multi-segment instruction 15	
	-100.0% ～ 100.0%	0.0%

Multi-segment instructions can be used in three occasions: as a frequency source, as a voltage source for VF separation, and as a setting source for process PID. In the three application scenarios, the dimension of the multi-segment instruction is a relative value, ranging from -100.0% to 100.0%. When used as a frequency source, it is a percentage of the relative maximum frequency; when used as a VF separation voltage source, it is a percentage relative to the rated voltage of the motor; and because the PID given is originally a relative value, the multi-segment instruction does not require dimension conversion as a PID setting source. The multi-segment instruction needs to be switched and selected according to the different states of the multi-function digital X. For details, please refer to the relevant instructions of Group F07.

f/10.16	Simple PLC operation mode	
	0～2	0

0: Stop after a single run

The inverter will automatically stop after completing a single cycle. At this time, you need to give a running command again to start. If the running time of a certain stage is 0, the operation will skip this stage and go directly to the next stage. As shown in the figure below:

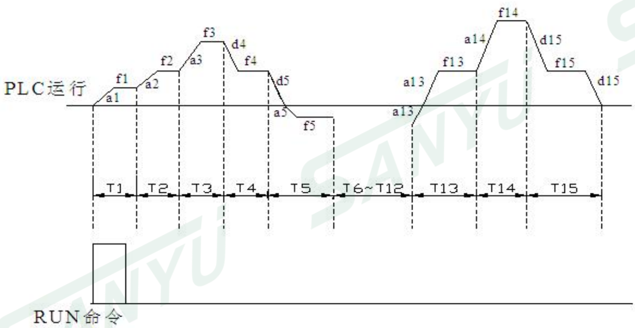


Figure F10-1 Schematic diagram of PLC stopping after a single cycle

1: Keep the final value after a single run

After the inverter completes a single cycle, it automatically maintains the operating frequency and direction of the last section. As shown in the figure below:

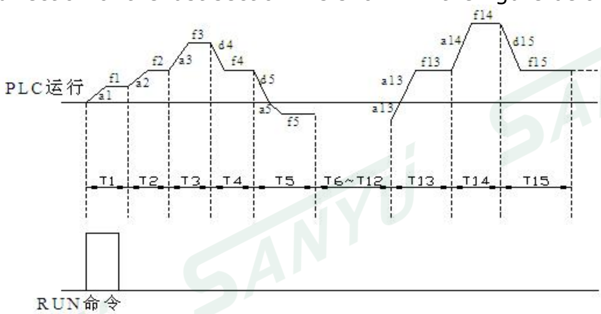


Figure F10-2 Schematic diagram of PLC holding after a single cycle

2: Keep looping

After the inverter completes one cycle, it will automatically start the next cycle and will not stop until there is a stop command. As shown in the following figure:

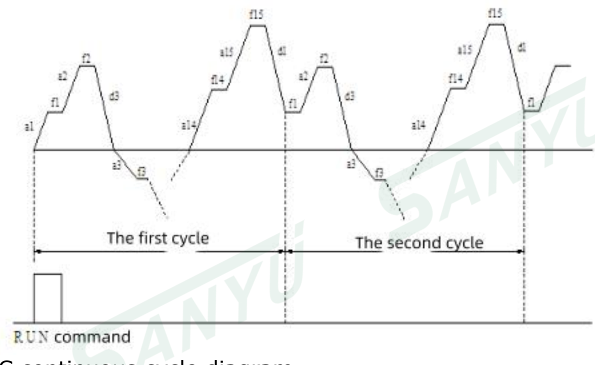


Figure F10-3 PLC continuous cycle diagram

f/10.17	Simple PLC power-off memory selection

	00～11	0 0

Units: Power-off memory selection
 0: No memory after power failure
 1: Power-off memory
Tens: Stop memory selection
 0: No memory when stopping
 1: Shutdown memory
PLC power-off memory means memorizing the PLC operation stage and frequency before power-off, and continuing to run from the memorized stage the next time you power on. If you choose not to memorize, the PLC process will be restarted every time you power on. PLC shutdown memory means recording the previous PLC operation stage and frequency when it stops, and continuing to run from the memorized stage the next time you run. If you choose not to memorize, the PLC process will be restarted every time you start.

f/10.18	Simple PLC 0th stage running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.19	Simple PLC 0th stage acceleration and deceleration time	
	0 to 3	0
f/10.20	Simple PLC first stage running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.21	Simple PLC first stage acceleration and deceleration time	
	0 to 3	0
f/10.22	Simple PLC second stage running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.23	Simple PLC second stage acceleration and deceleration time	
	0 to 3	0
f/10.24	Simple PLC 3rd stage running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.25	Simple PLC 3rd stage acceleration and deceleration time	
	0 to 3	0
f/10.26	Simple PLC 4th stage running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.27	Simple PLC 4th stage acceleration and deceleration time	
	0 to 3	0
f/10.28	Simple PLC 5th stage running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.29	Simple PLC 5th stage acceleration and deceleration time	
	0 to 3	0
f/10.30	Simple PLC 6th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.31	Simple PLC 6th stage acceleration and deceleration time	
	0 to 3	0
f/10.32	Simple PLC 7th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.33	Simple PLC 7th stage acceleration and deceleration time	
	0 to 3	0
f/10.34	Simple PLC 8th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.35	Simple PLC 8th stage acceleration and deceleration time	

	0 to 3	0
f/10.36	Simple PLC 9th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.37	Simple PLC 9th stage acceleration and deceleration time	
	0 to 3	0
f/10.38	Simple PLC 10th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.39	Simple PLC 10th stage acceleration and deceleration time	
	0 to 3	0
f/10.40	Simple PLC 11th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.41	Simple PLC 11th stage acceleration and deceleration time	
	0 to 3	0
f/10.42	Simple PLC 12th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.43	Simple PLC 12th stage acceleration and deceleration time	
	0 to 3	0
f/10.44	Simple PLC 13th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.45	Simple PLC 13th stage acceleration and deceleration time	
	0 to 3	0
f/10.46	Simple PLC 14th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.47	Simple PLC 14th stage acceleration and deceleration time	
	0 to 3	0
f/10.48	Simple PLC 15th segment running time	
	0.0s(h) ～ 6500.0s(h)	0.0s(h)
f/10.49	Simple PLC 15th stage acceleration and deceleration time	
	0 to 3	0
f/10.50	Simple PLC running time unit	
	0 to 1	0

0: S (seconds)
1: h (hour)

f/10.51	Multi-segment instruction 0 setting mode	
	0 to 6	0

0: Function code F 10.00 given
1: AI1
2: AI2
3: Panel potentiometer
4: PULSE
5: PID
6: Preset frequency (F 00.08) given, UP/DOWN can be modified
This parameter determines the given channel of multi-segment instruction 0. In addition to F10.00, multi-segment instruction 0 also has a variety of other options to facilitate switching between short instructions and other given modes. When multi-segment instructions are used as frequency source or simple PLC is used as frequency source, switching between the two frequency sources can be easily realized.

F 11 Group - Swing frequency, fixed length and counting

F11. 0 0	Swing setting method	
	0～1	0

0: relative to the center frequency
Relative to the center frequency (F00.07 frequency source), it is a variable swing system. The swing changes with the center frequency (set frequency).
1: Relative to the maximum frequency
Relative to the maximum frequency (F00.10), it is a fixed swing system with a fixed swing.

F11. 0 1	Swing frequency	
	0.0% ～ 100.0%	0.0%
F11. 0 2	Jump frequency amplitude	
	0.0% ～ 50.0%	0.0%

This parameter is used to determine the swing amplitude and the jump frequency value; when the swing amplitude is set relative to the center frequency (F11.00=0), the swing amplitude AW = frequency source F00.07 × swing amplitude F11.01. When the swing amplitude is set relative to the maximum frequency (F11.00=1), the swing amplitude AW = maximum frequency F11.10 × swing amplitude F11.01. The jump frequency amplitude is the frequency percentage of the jump frequency relative to the swing amplitude during swing frequency operation, that is: jump frequency = swing amplitude AW × jump frequency amplitude F11.02. If the swing amplitude is selected relative to the center frequency (F11.00=0), the jump frequency is a variable value. If the swing amplitude is selected relative to the maximum frequency (F11.00=1), the jump frequency is a fixed value. The swing frequency operation frequency is constrained by the upper and lower frequency limits.

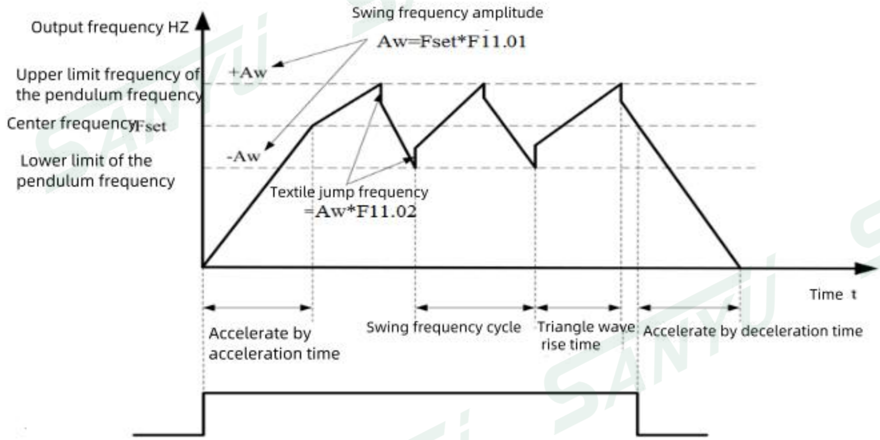


Figure F11-1 Schematic diagram of swing frequency operation

F11. 0 3	Swing frequency cycle	
	0.0s ～ 3000.0s	10.0s
F11. 0 4	Triangle wave rise time coefficient	

	0.0% ～ 100.0%	50.0%

Swing frequency cycle: the time value of a complete swing frequency cycle; the triangle wave rise time coefficient F11.04 is the percentage of the triangle wave rise time relative to the swing frequency cycle F11.03. Triangle wave rise time = swing frequency cycle F11.03 × triangle wave rise time coefficient F11.04, in seconds. Triangle wave fall time = swing frequency cycle F11.03 × (1 - triangle wave rise time coefficient F11.04), in seconds.

F11. 0 5	Set length	
	0m～65535m	1000m
F11. 0 6	Actual length	
	0m～65535m	0m
F11. 0 7	Pulses per meter	
	0.1～6553.5	100.0

The above function codes are used for fixed-length control; the length information needs to be collected through the multi-function digital input terminal. The number of pulses sampled by the terminal is divided by the number of pulses per meter F11.07 to calculate the actual length FB-06. When the actual length is greater than the set length F11.05, the multi-function digital output terminal outputs the "length reached" ON signal. During the fixed-length control process, the length reset operation can be performed through the multi-function X terminal (X function selection is 28), please refer to F07.00~F07.06 for details. In the application, the corresponding input terminal function needs to be set to "length count input" (function 27). When the pulse frequency is high, the X7 port must be used.

F11. 0 8	Set the count value	
	1 ~ 65535	1000
F11. 0 9	Specifying count value	
	1 ~ 65535	1000

The count value needs to be collected through the multi-function digital input terminal. In the application, the corresponding input terminal function needs to be set to "counter input"
(Function 25), when the pulse frequency is high, the X7 port must be used. When the count value reaches the set count value F11.08, the multi-function digital DO outputs the "set count value reached" ON signal, and then the counter stops counting. When the count value reaches the specified count value F11.09, the multi-function digital output terminal outputs the "specified count value reached" ON signal, and the counter continues to count until the "set count value" is reached. The specified count value F11.09 should not be greater than the set count value F11.08. Figure F11-1 is a schematic diagram of the set count value reached and the specified count value reached function.

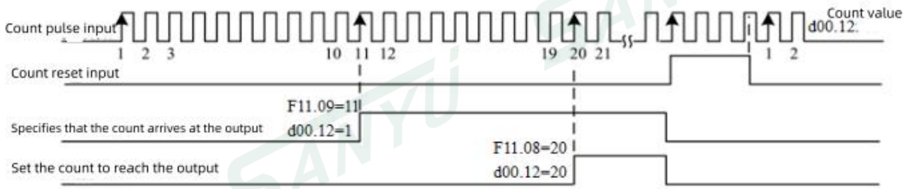


Figure F11-1 Schematic diagram of setting count value and specifying count value

F 12 Group - Fault and Protection

F12. 0 0	Motor overload protection selection	
	0～1	0

0: Disable
There is no motor overload protection function, and there may be a risk of motor overheating and damage. It is recommended to install a heating relay between the inverter and the motor.
1: Allow

At this time, the inverter determines whether the motor is overloaded based on the inverse time curve of the motor overload protection.

The inverse time curve of motor overload protection is: 220%×(F12.01)×motor rated current, if it lasts for 1 minute, it will alarm the motor overload fault; 150%×(F12.01)×motor rated current, if it lasts for 60 minutes, it will alarm the motor overload.

F12. 0 1	Motor overload protection gain	
	0.01～10.00	1.0 0

The user needs to correctly set the value of F12.01 according to the actual overload capacity of the motor. If this parameter is set too high, it may cause the motor to overheat and be damaged without the inverter giving an alarm!

F12. 0 2	Motor overload warning factor	
	50% ～ 100%	80%

This function is used to give the control system an early warning signal through the digital output terminal before the motor overload fault protection. The early warning coefficient is used to determine the extent of the early warning before the motor overload protection. The larger the value, the smaller the early warning advance. When the inverter output current accumulation is greater than the product of the overload inverse time curve and F12.02 , the inverter multi-function digital output terminal outputs the "motor overload pre-alarm" ON signal.

F12. 0 3	Overvoltage stall gain	
	0 (no overvoltage stall) ~ 100	0
F12. 0 4	Overvoltage stall protection voltage	
	120% ～ 150%	130%

During the inverter deceleration process, when the DC bus voltage exceeds the overvoltage stall protection voltage, the inverter stops deceleration and maintains the current operating frequency, and continues to decelerate after the bus voltage drops. The overvoltage stall gain is used to adjust the inverter's ability to suppress overvoltage during deceleration. The larger this value is, the stronger the overvoltage suppression ability is. Under the premise that no overvoltage occurs, the smaller the gain is set, the better. For loads with small inertia, the overvoltage stall gain should be small, otherwise it will cause the system dynamic response to slow down. For loads with large inertia, this value should be large, otherwise the suppression effect will be poor and an overvoltage fault may occur. When the overvoltage stall gain is set to 0, the overvoltage stall function is canceled. The base value corresponding to the overvoltage stall protection voltage setting of 100% is as follows:

Voltage level	Overvoltage stall protection voltage base value

Single phase 220V	290V
Three-phase 220V	290V
Three-phase 380V	530V

F/12.05	Overcurrent stall gain	
	0 ～ 100	20
F12. 0 6	Overcurrent stall protection current	
	100% ～ 200%	15 0%

Overcurrent stall: When the inverter output current reaches the set overcurrent stall protection current (F12.06), the inverter will reduce the output frequency during acceleration operation; reduce the output frequency during constant speed operation; slow down the deceleration speed during deceleration operation until the current is less than the overcurrent stall protection current (F12.06), and then the operating frequency will return to normal. See Figure F12-1 for details. Overcurrent stall protection current: Select the current protection point of the overcurrent stall function. When this parameter value is exceeded, the inverter starts to perform the overcurrent stall protection function. This value is a percentage of the rated current of the motor. Overcurrent stall gain: Used to adjust the inverter's ability to suppress overcurrent during acceleration and deceleration. The larger this value, the stronger the overcurrent suppression ability. Under the premise that no overcurrent occurs, the smaller the gain setting, the better. For small inertia loads, the overcurrent stall gain should be small, otherwise it will cause the system dynamic response to slow down. For large inertia loads, this value should be large, otherwise the suppression effect is not good and overcurrent faults may occur. In situations where the inertia is very small, it is recommended to set the overcurrent suppression gain to less than 20. When the overcurrent stall gain is set to 0, the overcurrent stall function is canceled.

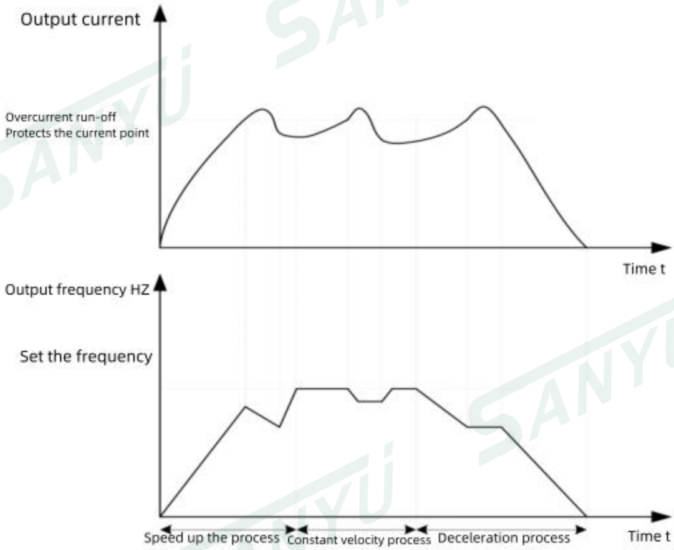


Figure F12-1 Schematic diagram of over-current stall protection

F/12.07	reserve	
	reserve	0

F12. 0 8	Braking start voltage	
	200.0～ 2000.0V	690.0V

If the DC voltage inside the inverter is higher than the energy-consuming braking start voltage, the built-in braking unit will be activated. If a braking resistor is connected at this time, the pumped-up voltage energy inside the inverter will be released through the braking resistor, causing the DC voltage to drop. When the DC voltage is lower than the braking start voltage, the built-in braking unit will be turned off.

F/12.09	Fault automatic reset times	
	0 ～ 200	0

When the inverter selects automatic fault reset, it is used to set the number of times it can be automatically reset. After exceeding this number, the inverter will remain in the fault state.

F/12.10	Fault digital output terminal action selection during fault automatic reset	
	0 to 1	0

0: No action
1: Action

If the inverter is set with the fault automatic reset function, whether the fault digital output terminal is activated during the fault automatic reset period can be set by F12.10.

F/12.11	Fault automatic reset interval	
	0.1s ～ 100.0s	6.0s

The waiting time from inverter fault alarm to automatic fault reset.

F/12.12	Input phase loss protection selection	
	0 to 1	Model confirmatio n

0: Disable (inverter power <= 11kW)
1: Allowed (inverter power > 11kW)

F/12.13	Output phase loss protection selection	
	0 to 1	0

0: Prohibit 1: Allow

F/12.14	First failure type	
	0 ~ 99	0
F/12.15	Second fault type	
	0 ~ 99	0
F/12.16	The third (most recent) fault type	
	0 ~ 99	0
F/12.17	The third fault frequency	
	0.00Hz～maximum frequency (F00.10)	0.00Hz
F/12.18	The third fault current	
	0.00A ～ 655.35A	0.00A
F/12.19	Bus voltage at the third fault	
	0.0V ～ 3000.0V	0.0V
F/12.20	Input terminal status at the third fault	
	0 ~ 127	0

F/12.21	Output terminal at the third fault	
	0 ~ 15	0
F/12.22	Inverter status at the third fault	
	0～1FH	0
F/12.23	Power-on time at the third fault	
	0 to 65535 hours	0
F/12.24	Running time at the third failure	
	0 to 65535 hours	0
F12.25 ～ F12.26	reserve	
	reserve	0
F/12.27	Second fault frequency	
	0.00Hz～maximum frequency (F00.10)	0.00Hz
F/12.28	Second fault current	
	0.00A ～ 655.35A	0.00A
F/12.29	Bus voltage at the second fault	
	0.0V ～ 3000.0V	0.0V
F/12.30	Input terminal status at the second fault	
	0 ~ 127	0
F/12.31	Output terminal at the second fault	
	0 ~ 15	0
F/12.32	Inverter status at the second fault	
	0～1FH	0
F/12.33	Power-on time at the second fault	
	0 to 65535 hours	0
F/12.34	Second fault running time	
	0 to 65535 hours	0
F/12.35	Inverter overload protection gain	
	0.01～10.00	1.00

The user needs to correctly set the value of F12.35 according to the actual overload capacity of the inverter. If this parameter is set too high, it may cause the inverter to overheat and be damaged without alarming!

F/12.36	reserve	
	reserve	0
F/12.37	First failure frequency	
	0.00Hz～maximum frequency (F00.10)	0.00Hz
F/12.38	First fault current	
	0.00A ～ 655.35A	0.00A
F/12.39	Bus voltage at the first fault	
	0.0V ～ 3000.0V	0.0V
F/12.40	Input terminal status at the first fault	
	0 ~ 127	0
F/12.41	Output terminal at first fault	
	0 ~ 15	0
F/12.42	Inverter status at the first fault	
	0～1FH	0
F/12.43	Power-on time at first fault	

	0 to 65535 hours	0
F/12.44	First failure running time	
	0 to 65535 hours	0
F/12.45	reserve	
	reserve	0
F/12.46	Power failure restart setting	
	00000 ～ 00011	00000

Units: Power-off restart selection
0: Invalid 1: Valid Tens: Undervoltage restart selection
0: Invalid
1: Valid Hundreds: Reserved Thousands: Reserved Tens of thousands: Reserved

F/12.47	Fault protection action selection 1	
	00000 ～ 22222	00000

Units: Motor overload (E-11)
0: Free stop
When "Free Stop" is selected, the inverter displays E-** and stops directly.
1: Stop according to the shutdown mode
When "Stop according to the stop mode" is selected: the inverter displays A** and stops according to the stop mode, and displays E-** after stopping.
2: Continue running
When "Continue to run" is selected: the inverter continues to run and displays A**, and the running frequency is set by F12.54.
Tens digit: Input phase loss (E-12) (same as ones digit)
Hundreds digit: Output phase loss (E-13) (same as ones digit)
Thousands place: External fault (E-15) (same as units place)
Ten thousand digit: Communication abnormality (E-16) (same as the ones digit)

F/12.48	Fault protection action selection 2	
	00000 ～ 22010	00000

Units: Reserved
Tens digit: Function code reading and writing abnormality (E-21)
0: Free stop
1: Stop according to the shutdown mode
Hundreds place: Reserved
Thousands place: Motor overheat (E-25) (same as F12.47 units place)
Ten thousandth digit: running time reached (E-26) (same as F12.47 digit)

F/12.49	Fault protection action selection 3	
	00000 ～ 22222	00000

Units digit: User-defined fault 1 (E-27) (same as F12.47 units digit)
Tens digit: User-defined fault 2 (E-28) (same as F12.47 ones digit)
Hundreds digit: Power-on time reached (E-29) (same as F12.47 units digit)
Thousands: Drop load (E-30)
0: Free stop
1: Stop according to the shutdown mode
2: Directly jump to 7% of the rated frequency of the motor and continue to run. If there is no load drop, it will automatically return to the set frequency.
Ten thousandth digit: PID feedback loss during operation (E-31) (same as F12.47 digit)

F/12.50	Fault protection action selection 4

	00000 ～ 00002	00000

Units: Speed deviation is too large (E-42) (same as F12.47 units)
Tens: Reserved
Hundreds place: Reserved
Thousands: Reserved
Ten thousand digit: reserved

F12.51 ～ F12.53	reserve	
	reserve	0
F/12.54	Fault-related frequency selection	
	0～4	0

0: Run at the current operating frequency
1: Run at set frequency
2: Run at upper frequency limit
3: Run at the lower frequency limit
4: Running at abnormal standby frequency

F/12.55	Abnormal backup frequency	
	0.0% ~ 100.0% (maximum frequency)	100.0%

When a fault occurs during the operation of the inverter, and the handling method of the fault is set to continue to run, the inverter displays A** and runs at the frequency determined by F12.54. When the abnormal backup frequency is selected, the value set by F12.55 is a percentage relative to the maximum frequency.

F12.56 ～ F12.58	reserve	
	reserve	0
F/12.59	Instantaneous power failure action selection	
	0～2	0

0: Invalid
1: Slow down
2: Deceleration and stop

F/12.60	Momentary stop action pause judgment voltage	
	80.0% ～ 100.0%	90.0%
F/12.61	Instantaneous power outage voltage recovery judgment time	
	0.00s ～ 100.00s	0.50s
F/12.62	Instantaneous power failure action judgment voltage	
	60.0% ~ 100.0% (standard bus voltage)	80.0%

F12.59~F12.62 means that when there is a power outage or voltage drops suddenly, the inverter reduces the output speed and uses the load feedback energy to compensate for the reduction of the inverter DC bus voltage to maintain the inverter's continued operation. If F12.59=1, the inverter decelerates when there is a power outage or voltage drops suddenly. When the bus voltage returns to normal, the inverter accelerates normally to the set frequency. The basis for judging whether the bus voltage has returned to normal is that the bus voltage is normal and the duration exceeds the F12.61 setting time; if F12.59=2, when there is a power outage or voltage drops suddenly, the inverter decelerates until it stops.

F/12.63	Momentary stop action pause judgment voltage	
	80.0% ～ 100.0%	90.0%

0: Invalid
1: Valid

F/12.64	Load drop detection level	
	0.0% ~ 100.0% (rated motor current)	10.0%
F12.65	Load drop detection time	
	0.0s ～ 60.0s	1.0s

If the off-load protection function is effective, when the inverter output current is less than the off-load detection level F12.64 and the duration is greater than the off-load detection time F12.65, the inverter output frequency will automatically decrease to 7% of the rated frequency. During the off-load protection period, if the load is restored, the inverter will automatically return to running at the set frequency.

F/12.66	reserve	
	reserve	0
F/12.67	reserve	
	reserve	0
F/12.68	Speed deviation too large detection value	
	0.0% ~ 50.0% (maximum frequency)	20.0%
F/12.69	Speed deviation too large detection time	
	0.0s ～ 60.0s	0.0s

This function is only valid when the inverter is running in vector control with speed sensor; when the inverter detects that the actual speed of the motor deviates from the set frequency, and the deviation is greater than the speed deviation detection value F12.68, and the duration is greater than the speed deviation detection time F12.69, the inverter fault alarm E-42 is issued and processed according to the fault protection action mode. When the speed deviation detection time is 0.0s, the speed deviation fault detection is canceled.

F/12.70	Instantaneous stop without stopping gain Kp	
	0 ～ 100	40
F/12.71	Instantaneous power failure integral coefficient Ki	
	0 ～ 100	30

This parameter is only valid for "bus voltage constant control (F12.59=1)". If the instantaneous stop without stopping process is prone to undervoltage, please increase the instantaneous stop without stopping gain and instantaneous stop without stopping integral coefficient.

F12.72	Momentary stop and non-stop action deceleration time	
	0.0 ～ 300.0s	20.0s

This parameter is only valid for "deceleration stop (F12.59 = 2)". When the bus voltage is lower than the action voltage set by F12.62, the inverter executes deceleration stop, and the deceleration time is determined by this parameter, not F00.18.

F 13 Group - Communication Parameters

F13.00	MODBUS communication baud rate	
	0～9	6

0-1: Reserved
2: 1200BPS
3: 2400BPS
4:4800BPS
5:9600BPS
6:19200BPS
7:38400BPS
8:57600BPS
9:115200BPS

This function code is used to define the data transmission rate between the host computer and the inverter. The baud rates set by the host computer and the inverter should be consistent, otherwise communication cannot be carried out. The larger the baud rate setting, the faster the data communication, but setting too high will affect the stability of communication.

F13. 0 1	MODBUS Data Format	
	0～3	1

0: No check (8-N-2)
1: Even parity (8-E-1)
2: Odd parity (8-O-1)
3: No check (8-N-1)

The data format set by the host computer and the inverter should be consistent, otherwise normal communication will not be possible.

F13. 0 2	Local address	
	1～247	1

In 485 communication, this function code is used to identify the address of this inverter.

F13. 0 3	MODBUS reply delay	
	0～20ms	2

This function code defines the time interval between the inverter receiving the data frame and sending the response data frame to the host computer. If the response time is less than the system processing time, the system processing time shall prevail. If the delay is greater than the system processing time, the system will wait for a delay after processing the data until the response delay time is reached before sending the data to the host computer.

F/13.04	RS485 communication timeout	
	0.1～60.0s	5.0

If RS485 communication does not receive the correct data signal within the time interval defined by this function code, it is considered that RS485 communication is abnormal, and the inverter will take corresponding actions according to the setting of F10.24. When this value is set to 0.0, RS485 communication timeout detection will not be performed.

F13. 0 5	MODBUS protocol selection	
	0～1	1

0: Non-standard MODBUS protocol
1: Standard MODBUS protocol

F13. 0 6	RS485 communication read current resolution	
	0～1	0

0:0.01A
1:0.1A

F13. 0 7	RS485 communication protocol selection	
	0～10	0

0: SY3000 protocol
1: A900 protocol
2 to 10: Reserved

F13. 0 8	RS485 communication timeout detection selection	
	0～1	0

0: valid throughout the whole process
1: invalid during shutdown

F 14 Group - **Keyboard and Display**

F14.00	FUNC key function selection	
	0～4	3

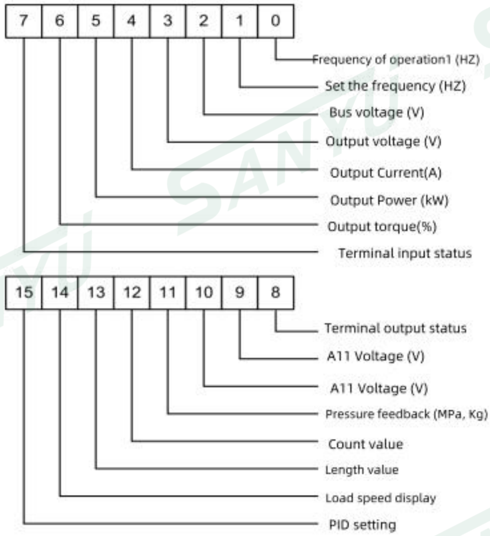
0: FUNC key is invalid
1: Switch between the operation panel command channel and the remote command channel (terminal command channel or communication command channel)
Refers to the switching of command sources, that is, the switching between the current command source and keyboard control (local operation). If the current command source is keyboard control, this key function is invalid.
2: Forward and reverse switching
Use the FUNC key to switch the direction of the frequency command. This function is only valid when the command source is the operation panel command channel.
3: Forward jog
Use the FUNC key on the keyboard to achieve forward jog (FJOG).
4: Reverse jog
Use the FUNC key on the keyboard to achieve reverse jog (RJOG).

F/14.01	STOP/RESET key function	
	0～1	3

0: The STOP/RES key stop function is valid only in keyboard operation mode.
1: In any operation mode, the STOP/RES key stop function is valid

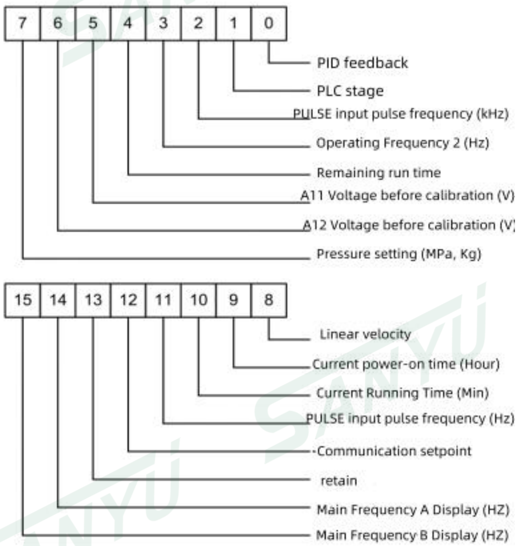
F/14.02	LED operation display parameters 1	
	0000～FFFFH	1FH

If the above parameters need to be displayed during operation, set the corresponding position to 1, convert the binary number to hexadecimal and set it in F14.02.



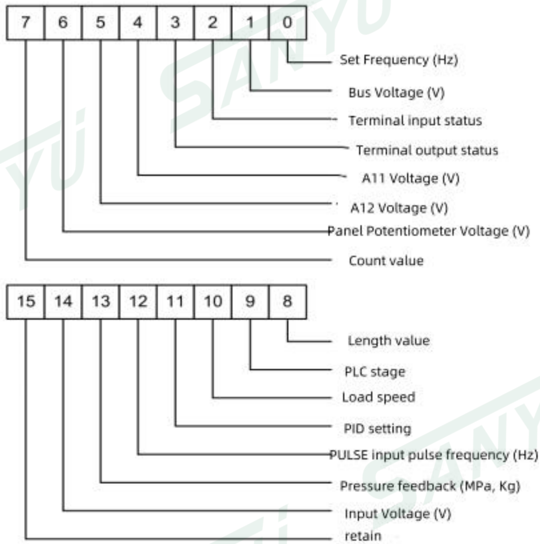
F/14.03	LED operation display parameters 2	
	0000～FFFFH	1FH

If the above parameters need to be displayed during operation, set the corresponding position to 1, convert the binary number to hexadecimal and set it in F14.03.



F/14.04	LED stop display parameters	
	0000～FFFFH	1FH

If the above parameters need to be displayed when the machine is stopped, set the corresponding position to 1, convert the binary number to hexadecimal and set it in F14.04.



F/14.05	LED operation auxiliary display parameters	
	0 ~ 80	4
F/14.06	LED shutdown auxiliary display parameters	
	0 ~ 80	38

By changing the setting value of the above function code, the monitoring items of the main monitoring interface can be changed. For example, if F14.05=3 is set, the output voltage d00.03 is selected. When running, the default display item of the auxiliary display interface is the current output voltage value .

F/14.07	Load speed display factor	
	0.0001～6.5000	1.0000

When the load speed needs to be displayed, this parameter is used to adjust the corresponding relationship between the inverter output frequency and the load speed. For the specific corresponding relationship, refer to the description of F14.10.

F/14.08	Inverter module heat sink temperature	
	0.0℃～ 100.0℃	0.0℃

Displays the temperature of the inverter module IGBT. The over-temperature protection value of the inverter module IGBT of different models is different.

F/14.09	Cumulative running time	
	0h～65535h	0h

Displays the inverter's cumulative running time. When the running time reaches the set running time F02.17, the inverter's multi-function digital output function (12) outputs an ON signal.

F/14.10	Load speed display decimal places	
	0～3	1

0 : 0 decimal places
1 : 1 decimal place
2 ： 2 decimal places
3 ： 3 decimal places
Used to set the number of decimal places for load speed display. If the load speed display coefficient F14.07 is 2.0000, the load speed decimal place F12.10 is 2 (2 decimal places), when the inverter operating frequency is 40.00Hz, the load speed is: 40.00*2.0000 = 80.00 (2 decimal places display); if the inverter is in the stop state, the load speed is displayed as the speed corresponding to the set frequency, that is, "set load speed". Taking the set frequency of 50.00Hz as an example, the load speed in the stop state is: 50.00*2.0000 = 100.00 (2 decimal places display).

F/14.11	Cumulative power-on time	
	0h～ 65535h	0h

Displays the cumulative power-on time of the inverter since leaving the factory; when this time reaches the set power-on time (F02.16), the inverter multi-function digital output function (24) outputs an ON signal.

F/14.12	Cumulative power consumption	
	0～65535 degrees	0 degree

Displays the inverter's cumulative power consumption so far.

F/14.13	Hardware version number	
	V0.00～V9.99	V1.00
F/14.14	Software version number	
	V0.00～V9.99	V1.00
F/14.15	Software batch number	
	0.0000～9.9999	3.0115

F 15 Group - **Function Code Management**

F15.00	user password	
	0～65535	00000

If F15.00 is set to any non-zero number, the password protection function will take effect. The next time you enter the menu, you must enter the password correctly, otherwise you will not be able to view and modify the function parameters. Please remember the set user password. If F15.00 is set to 00000, the set user password will be cleared and the password protection function will be invalid.

F/15.01	Parameter initialization	
	0～3	0

0: No operation
The inverter is in normal parameter reading and writing state. Whether the function code setting value can be changed depends on the setting state of the user password and the current working state of the inverter.

1: All user parameters except motor parameters are restored to factory settings
The motor parameters are not restored, and other user parameters are restored to factory settings according to the model.
2: All user parameters are restored to factory settings
All user parameters are restored to factory settings according to the model.
3: Clear fault records
Clear the contents of the fault records (F12.14~F12.44).
After the operation is completed, this function code is automatically cleared to 0.

F/15.02	Function code modification properties	
	0～1	0

0: Editable
1: Unmodifiable
The user sets whether the function code parameters can be modified to prevent the function parameters from being modified by mistake. If the function code is set to 0, all function codes can be modified; if it is set to 1, all function codes can only be viewed but not modified.

F/15.03 ~ F15.04	reserve	
	reserve	0

F 16 Group - Water Supply Parameters Group

F16.00	Terminal connection and disconnection delay	
	0.0～6000.0S	0.1

Pump on/off delay time.

F16.01	Polling time	
	0.0～6000.0h	48 .0

The polling time is the time for regularly switching the variable frequency pump, which is only valid when a single pump is working.

F/16.02	Pump reduction lower frequency	
	0.0～ Upper frequency limit	35.00

When the feedback pressure is higher than the set pressure, the frequency drops to the lower limit frequency of pump reduction, and the pump is reduced after the pump reduction delay time.

F/16.03	Pump delay time	
	0.0～3600.0S	5.0
F/16.04	Pump reduction delay time	
	0.0～3600.0S	5.0
F/16.05	Pump sleep waiting time	
	0.0～3600.0S	2.0
F/16.06	Water pump wake-up waiting time	
	0.0～3600.0S	1.0
F/16.07	Water pump wake-up pressure point	
	(0.0-100.0%)*（F16.08）	80.0%
F/16.08	Pressure setting (MPa, Kg)	
	0.00～F1 5.09 （MPa, Kg）	5.00

F/16.09	Sensor range	
	0.00-100.00 (MPa, Kg)	10.00

If F00.03=10, select the sensor range (F16.09) and given pressure (F16.08) according to the site conditions.

F/16.10	Solar panel maximum power node	
	50.0%～100.0%	81.0

This function code can be used to set the minimum voltage reference for maximum power tracking. The minimum voltage reference for maximum power tracking = maximum operating voltage of the photovoltaic panel / open circuit voltage of the photovoltaic panel.

F/16.11	VF speed adjustment coefficient	
	0.000～2.000	1.000

This parameter can adjust the output frequency corresponding to the maximum power point. It should be set reasonably. Setting it too large will cause weak magnetic field. This parameter is only valid when F00.00=8 .

F/16.12	MPPT high point working voltage	
	(F16.1 3)～200.0%	100.0%
F/16.13	MPPT low point operating voltage	
	0.0%～（F16.1 2 ）	75.0%
F/16.14	MPPT high point voltage frequency point	
	0.00Hz～maximum frequency (F00.10)	50.00
F/16.15	MPPT low point voltage frequency point	
	0.00Hz～maximum frequency (F00.10)	0.00
F/16.16	MPPT low voltage protection point	
	40.0 %～ 100.0 %	45.0%
F/16.17	Water shortage detection starting frequency	
	0.00Hz～maximum frequency (F00.10)	10.00
F/16.18	The ratio of photovoltaic water pump water shortage detection current to no-load current	
	0.0%～300.0%* no-load current (F03.10)	0.0
F/16.19	Photovoltaic water pump water shortage detection time	
	0～6000.0s	0.0
F/16.20	Photovoltaic undervoltage self-start delay	
	0.1～6000.0s	2.0
F/16.21	Photovoltaic water shortage self-start delay	
	0.1～6000.0s	15.0

When F00.00=7 (PV water supply voltage tracking mode), when the bus voltage (d00.02) is higher than the MPPT high point working voltage (F16.12) setting value, it runs at the maximum frequency; if it is lower than the MPPT high point working voltage (F16.13) setting value, it runs at the frequency obtained by (bus voltage/MPPT high point working voltage) * maximum frequency. If the bus voltage reaches the MPPT low point working voltage (F16.13), it runs at the water shortage detection starting frequency (F16.17). If the inverter runs above the water shortage detection starting frequency, and the output current is less than the motor no-load current * the photovoltaic water pump water shortage detection current corresponding to the no-load current ratio (F16.18), after the photovoltaic water pump water shortage detection time (F16.19), the inverter reports a water shortage fault E-65.

When F16.20=0.0, the undervoltage self-start function is invalid; when F16.21=0.0, the photovoltaic water shortage self-start function is invalid.

F/16.22	Power search time	
	0.050～60.000	0.500
F/16.23	Power search gain	
	10～500	125
F/16.24	Power search speed gain	
	1～1000	100
F/16.25	Pre-search upsampling time	
	0.01～600.00s	15.00
F/16.26	Pre-search frequency reduction time	
	0.01～600.00s	15.00

When F00.00=8 (PV water supply power tracking VF mode) and F00.00=9 (PV water supply power tracking SVC mode), F16.22~F16.26 are valid.

F 17 Group - Control Optimization Parameters

F17.00	DPWM switching upper limit frequency	
	0.00Hz ～ 15Hz	8.00Hz

Only valid for VF control; the wave generation mode of the asynchronous machine during VF operation is determined. If it is lower than this value, it is a 7-segment continuous modulation mode, otherwise it is a 5-segment intermittent modulation mode. When it is a 7-segment continuous modulation mode, the switching loss of the inverter is large, but the current ripple is small; in the 5-segment intermittent debugging mode, the switching loss is small and the current ripple is large; but at high frequencies, it may cause instability in motor operation, and generally no modification is required. For VF operation instability, please refer to function code F06.11, and for inverter loss and temperature rise, please refer to function code F00.15.

F/17.01	PWM modulation method	
	0～1	0

0: Asynchronous modulation
1: Synchronous modulation

Only valid for VF control; synchronous modulation means that the carrier frequency changes linearly with the output frequency to ensure that the ratio of the two (carrier ratio) remains unchanged. It is generally used when the output frequency is high, which is beneficial to the output voltage quality. At lower output frequencies (below 100Hz), synchronous modulation is generally not required, because the ratio of the carrier frequency to the output frequency is relatively high at this time, and the advantages of asynchronous modulation are more obvious. Synchronous modulation is only effective when the operating frequency is higher than 85Hz, and the asynchronous modulation mode is fixed below this frequency.

F17.02	Dead zone compensation mode selection	
	0～ 1	1

0: No compensation
1: Compensation mode

This parameter generally does not need to be modified. You only need to try switching to a different compensation mode when there are special requirements for the output voltage waveform quality, or when the motor has abnormalities such as oscillation. Compensation mode 2 is recommended for high power.

F/17.03	Random PWM Depth	
	0～ 10	0

0: Random PWM is invalid
1 to 10: PWM carrier frequency random depth
Setting random PWM can make the monotonous and harsh motor sound softer and help reduce external electromagnetic interference. When the random PWM depth is set to 0, random PWM is invalid. Adjusting different random PWM depths will produce different effects.

f/17.04	Wave-by-wave current limiting enable	
	0～ 1	1

0: Disable
1: Enable

Enabling the fast current limiting function can minimize the inverter overcurrent faults and ensure the uninterrupted operation of the inverter. If the inverter is in the fast current limiting state for a long time, the inverter may be damaged by overheating, which is not allowed. Therefore, when the inverter is in the fast current limiting state for a long time, the inverter will alarm fault E-40, indicating that the inverter is overloaded and needs to be shut down.

F/17.05	Current Sense Compensation	
	0～ 100	5

Used to set the current detection compensation of the inverter. Setting it too large may cause the control performance to deteriorate. Generally, no modification is required.

F/17.06	Undervoltage point setting	
	200.0V ～ 2 0 00.0V	100.0%

It is used to set the voltage value of the inverter undervoltage fault E-09. Inverters of different voltage levels 100.0% correspond to different voltage points, which are:

Voltage level	Undervoltage point base value
Single phase 220V	200V
Three-phase 220V	200V
Three-phase 380V	350V

F/17.07	reserve	
	reserve	0
F/17.08	Overvoltage point setting	
	200.0V ～ 2200.0V	Model confirmati on

Used to set the voltage value of the inverter overvoltage fault. The factory values of different voltage levels are:

Voltage level	Overvoltage point factory value
Single phase 220V	400.0 V
Three-phase 220V	400.0 V
Three-phase 380V	800.0 V

F 18 Group - AI Curve Settings

F18.00	AI curve 4 minimum input	
	-10.00V～【F18.02】	0.0 0 V
F18.01	AI curve 4 minimum input corresponding setting	
	-100.0% ～ 100.0%	0.0%
F/18.02	AI curve 4 inflection point 1 input	
	F18.00 to F18.04	3.00 V
F/18.03	AI curve 4 inflection point 1 input corresponding setting	
	-100.0% ～ 100.0%	3 0.0%
F/18.04	AI curve 4 inflection point 2 input	
	F18.02 to F18.06	6.00 V
F/18.05	AI curve 4 inflection point 2 input corresponding setting	
	-100.0% ～ 100.0%	6 0.0%
F/18.06	AI Curve 4 Maximum Input	
	F18.06～10.00	1 0.00 V
F/18.07	AI curve 4 maximum input corresponding setting	
	-100.0% ～ 100.0%	10 0.0%
F/18.08	AI Curve 5 Minimum Input	
	-10.00V～【F18.10】	0.0 0 V
F/18.09	AI curve 5 minimum input corresponding setting	
	-100.0% ～ 100.0%	0.0%
F/18.10	AI curve 5 inflection point 1 input	
	F18.08 to F18.12	3.00 V
F/18.11	AI curve 5 inflection point 1 input corresponding setting	
	-100.0% ～ 100.0%	3 0.0%
F/18.12	AI Curve 5 Inflection Point 2 Input	
	F18.10 to F18.14	6.00 V
F/18.13	AI curve 5 inflection point 2 input corresponding setting	
	-100.0% ～ 100.0%	6 0.0%
F/18.14	AI Curve 5 Maximum Input	
	F18.14～10.00	1 0.00 V
F/18.15	AI curve 5 maximum input corresponding setting	
	-100.0% ～ 100.0%	10 0.0%

The functions of curves 4 and 5 are similar to those of curves 1 to 3, but curves 1 to 3 are straight lines, while curves 4 and 5 are
It is a 4-point curve, which can realize a more flexible corresponding relationship. Figure F18-1 is a schematic diagram of curves 4 to 5.
When setting curve 4 and curve 5, please note that the minimum input voltage, inflection point 1 voltage, inflection point 2 voltage, and maximum voltage of the curve must

increase in sequence. AI curve selection F07.33 is used to determine how analog input AI1~AI2 is selected among the 5 curves.

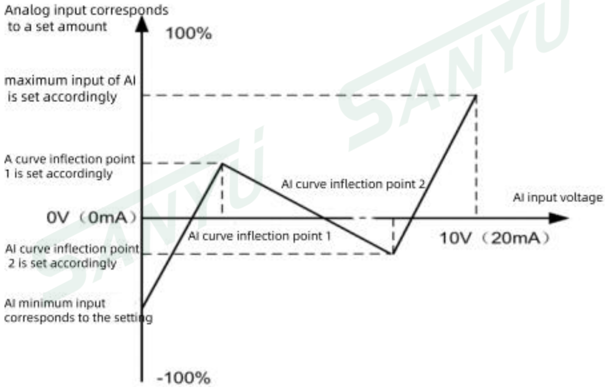


Figure F18-1 Schematic diagram of curve 4 and curve 5

F/18.16	AI 1 set jump point	
	-100.0% ～ 100.0%	0.0%
F/18.17	AI1 sets the jump range	
	0.0% ～ 100.0%	0.1 %
F/18.18	AI 2 set jump point	
	-100.0% ～ 100.0%	0.0%
F/18.19	AI 2 sets the jump range	
	0.0% ～ 100.0%	0.1 %
F/18.20	Panel potentiometer setting jump point	
	-100.0% ～ 100.0%	0.0%
F/18.21	Panel potentiometer sets the jump amplitude	
	0.0% ～ 100.0%	0.1 %

F FF Group - **Manufacturer Parameters**

FFF.00	Manufacturer password	
	0 to 65535	0 0000

Chapter Eight EMC (Electromagnetic Compatibility)

8.1 Definition

Electromagnetic compatibility means that electrical equipment can operate in an environment with electromagnetic interference without interfering with the electromagnetic environment and can stably achieve its Functional capabilities.

8.2 Introduction to EMC standards

According to the requirements of national standard GB/T12668.3 , the inverter needs to meet the requirements of electromagnetic interference and anti-electromagnetic interference.

Our existing products implement the latest international standards: IEC / EN 61800-3 : 2004 (Adjustable speed el ectrical power drive systems part 3: EMC requirements and specific test methods), which is equivalent to the national standard GB/T12668.3 .

IEC/EN61800-3 mainly examines the inverter from two aspects: electromagnetic interference and anti-electromagnetic interference. Test the radiated interference, conducted interference and harmonic interference of the inverter (this requirement applies to inverters used for civil purposes). Electromagnetic interference mainly tests the inverter's conducted immunity, radiation immunity, surge immunity, fast mutation pulse group immunity, ESD immunity and power supply low-frequency end immunity (specific test items are:

1. Immunity test for input voltage sag, interruption and change;
2. Commutation notch immunity test;
3. Harmonic input immunity test;
4. Input frequency change test;
5. Input voltage imbalance test;
6. Input voltage fluctuation test). According to the strict requirements of IEC/EN61800-3 , our products are installed and used according to the guidance shown in 7.3 , and will have good electromagnetic compatibility in general industrial environments.

8.3 EMC guidance

8.3.1 Impact of harmonics :

The high-order harmonics of the power supply can damage the inverter. Therefore, in some places where the quality of the power grid is relatively poor, it is recommended to install an AC input reactor.

8.3.2 Electromagnetic interference and installation precautions:

There are two types of electromagnetic interference. One is the interference of electromagnetic noise in the surrounding environment to the inverter, and the other is the interference generated by the inverter to surrounding equipment.

Installation Precautions:

1) The grounding wires of the inverter and other electrical products should be well grounded;

2) The power input and output lines of the inverter and the weak current signal lines (such as control lines) should not be arranged in parallel. When the parts are arranged vertically;

3) It is recommended to use shielded cables or steel pipes to shield the output power lines of the inverter, and the shielding layer should be reliably connected to the For the leads of the interfered equipment, it is recommended to use twisted-pair shielded control cables and ground the shielding layer reliably;

4) For motor cables longer than 100m , an output filter or reactor is required.

8.3.3 How to deal with the interference of surrounding electromagnetic equipment to the inverter:

Generally, the reason for electromagnetic influence on the inverter is that a large number of relays, contactors or electromagnetic brakes are installed near the inverter. When the inverter is disturbed and malfunctions, it is recommended to use the following solutions:

1) Install surge suppressors on devices that generate interference;

2) Install a filter at the input end of the inverter. Refer to 7.3.6 for details.

3) Use shielded cables for the inverter control signal lines and detection line leads, and ground the shielding layer reliably.

8.3.4 Solutions to the interference caused by the inverter to the peripheral equipment :

There are two types of noise: one is the inverter radiation interference, and the other is the inverter conduction interference. These two types of interference cause the surrounding electrical equipment to be affected by electromagnetic or electrostatic induction, which in turn causes the equipment to malfunction. Please refer to the following methods to solve the problem:

1) The signals of the measuring instruments, receivers and sensors are usually weak. When in the same control cabinet, it is easy to be disturbed and malfunction. It is recommended to use the following methods to solve it: Try to stay away from interference Do not lay signal lines and power lines in parallel, especially do not bundle them together; Use shields for signal lines and power lines. Shielded wires and good grounding; add a ferrite ring (select a suppression frequency within the range of 30 to 1000MHz) on the output side of the inverter and wind it 2 to 3 turns in the same direction. For severe conditions, you can choose to install an EMC output filter;

2) When the interfered equipment and the inverter use the same power supply, it will cause conducted interference. If the above methods cannot eliminate it, If there is interference, an EMC filter should be installed between the inverter and the power supply (refer to 7.3.6 for selection);

3) The peripheral equipment is grounded separately to eliminate the interference caused by leakage current in the inverter grounding wire when the ground is shared.

8.3.5 Leakage current and treatment:

There are two forms of leakage current when using a frequency converter: one is leakage current to the ground; the other is leakage current between lines.

1) Factors affecting ground leakage current and solutions:

There is distributed capacitance between the conductor and the earth. The larger the distributed capacitance, the greater the leakage current. Effectively reduce the distance between the inverter and the motor to Reduce distributed capacitance. The higher the carrier frequency, the greater the leakage current. You can reduce the carrier frequency to reduce leakage current. However, reducing the carrier frequency will This will cause the motor noise to increase. Please note that installing a reactor is also an effective way to solve the leakage current problem.

The leakage current will increase as the loop current increases, so when the motor power is large, the corresponding leakage current is large.

2) Factors causing leakage current between lines and solutions:

There is distributed capacitance between the inverter output wiring. If the current passing through the line contains high-order harmonics, it may cause resonance and generate Leakage current. If a thermal relay is used at this time, it may cause malfunction.

The solution is to reduce the carrier frequency or install an output reactor. When using the inverter, it is recommended that there is no Install a thermal relay and use the electronic overcurrent protection function of the inverter.

8.3.6 Notes on installing EMC input filter at the power input :

1) ⚠Note : Please use the filter strictly according to the rated value; since the filter is a Class I electrical appliance, the metal outer shell of the filter The shell ground should have good contact with the metal ground of the installation cabinet over a large area and should have good conductive continuity, otherwise there will be a risk of contact. Electrical hazards and serious impact on EMC effects;

2) Through EMC testing, it is found that the filter ground must be connected to the same common ground as the inverter PE terminal ground, otherwise it will seriously affect Impact EMC effect.

3) Install the filter as close as possible to the power input terminal of the inverter.

Chapter Nine Fault diagnosis and countermeasures

9.1 Fault alarm and countermeasures

During operation, if an abnormality occurs, the inverter will immediately block the PWM output and enter the fault protection state. At the same time, the fault code displayed on the keyboard flashes to indicate the current fault information. At the same time, the fault indicator ALM lights up. At this time, you need to check the cause of the fault and the corresponding treatment method according to the prompts in this section. If the problem still cannot be solved, please contact our company directly. For the corresponding solutions, please refer to Table 9-1 Fault Diagnosis and Troubleshooting.

Fault name	Operation panel display	Troubleshooting	Troubleshooting measures
Inverter unit protecti on	E-01	1. Short circuit of inverter output circuit 2. Wiring between motor and inverter is too long 3. Module overheating 4. Loose wiring inside inverter 5. Abnormal main control board 6. Abnormal drive board 7. Abnormal inverter module	1. Eliminate peripheral faults 2. Install reactors or output filters 3. Check whether the air duct is blocked, whether the fan is working properly, and eliminate any problems 4. Plug in all connecting cables 5. Seek technical support 6. Seek technical support 7. Seek technical support
Accelera ting overcurr ent	E-02	1. The inverter output circuit is grounded or short-circuited 2. The control mode is vector and parameter identification is not performed 3. The acceleration time is too short 4. Manual torque boost or V/F curve is not suitable 5. The voltage is too low 6. Starting the rotating motor 7. Sudden load during acceleration 8. The inverter is too small	1. Eliminate peripheral faults 2. Identify motor parameters 3. Increase acceleration time 4. Adjust manual torque increase or V/F curve 5. Adjust voltage to normal range 6. Select speed tracking start or wait until the motor stops before starting 7. Cancel sudden load 8. Select a frequency converter with a higher power level

Deceleration overcurrent	E-03	1. The inverter output circuit is grounded or short-circuited 2. The control mode is vector and parameter identification is not performed 3. The deceleration time is too short 4. The voltage is low 5. The load is suddenly added during the deceleration process 6. The brake unit and brake resistor are not installed	1. Eliminate peripheral faults 2. Identify motor parameters 3. Increase deceleration time 4. Adjust voltage to normal range 5. Remove sudden load 6. Install brake unit and resistor
Constant speed overcurrent	E-04	1. The inverter output circuit is grounded or short-circuited 2. The control mode is vector and parameter identification is not performed 3. The voltage is too low 4. Is there a sudden load during operation 5. The inverter is too small	1. Eliminate peripheral faults 2. Identify motor parameters 3. Adjust voltage to normal range 4. Remove sudden load 5. Select a frequency converter with higher power rating
Accelerating overvoltage	E-05	1. The input voltage is too high . 2. There is an external force dragging the motor during acceleration. 3. The acceleration time is too short. 4. No brake unit and brake resistor are installed.	1. Adjust the voltage to the normal range 2. Cancel the external power or install a brake resistor 3. Increase the acceleration time 4. Install a brake unit and resistor
Deceleration overvoltage	E-06	1. The input voltage is too high . 2. There is an external force dragging the motor during deceleration. 3. The deceleration time is too short. 4. No brake unit and brake resistor are installed.	1. Adjust the voltage to the normal range 2. Cancel the external power or install a brake resistor 3. Increase the deceleration time 4. Install a brake unit and resistor
Constant speed overvoltage	E-07	1. The input voltage is too high . 2. There is an external force dragging the motor during operation.	1. Adjust the voltage to the normal range 2. Cancel the external power or install a braking resistor
Control power failure	E-08	1. The input voltage is not within the specified range	1. The input voltage is not within the specified range

Undervo ltage fault	E-09	1. Instantaneous power failure 2. The voltage at the input end of the inverter is not within the range required by the specification 3. The bus voltage is abnormal 4. The rectifier bridge and buffer resistor are abnormal 5. The drive board is abnormal 6. The control board is abnormal	1. Reset the fault 2. Adjust the voltage to the normal range 3. Seek technical support 4. Seek technical support 5. Seek technical support 6. Seek technical support
Inverter overloa d	E-10	1. Is the load too large or the motor is blocked? 2. The inverter is too small.	1. Reduce the load and check the motor and mechanical conditions . 2. Choose a frequency converter with a higher power rating.
Motor overloa d	E-11	1. The three-phase input power supply is abnormal 2. The driver board is abnormal 3. The lightning protection board is abnormal 4. The main control board is abnormal	1. Check and eliminate problems in peripheral circuits 2. Seek technical support 3. Seek technical support 4. Seek technical support
Input phase loss	E-12	1. The three-phase input power supply is abnormal 2. The driver board is abnormal 3. The lightning protection board is abnormal 4. The main control board is abnormal	1. Check and eliminate problems in peripheral circuits 2. Seek technical support 3. Seek technical support 4. Seek technical support
Output phase loss	E-13	1. The lead from the inverter to the motor is abnormal. 2. The three-phase output of the inverter is unbalanced when the motor is running. 3. The drive board is abnormal. 4. The module is abnormal.	1. Eliminate peripheral faults 2. Check whether the three-phase winding of the motor is normal and eliminate the fault 3. Seek technical support 4. Seek technical support
Module overhea ting	E-14	1. The ambient temperature is too high 2. The air duct is blocked 3. The fan is damaged 4. The module thermistor is damaged 5. The inverter module is damaged	1. Lower the ambient temperature 2. Clean the air duct 3. Replace the fan 4. Replace the thermistor 5. Replace the inverter module
External device failure	E-15	1. Input external fault signal through multi-function terminal X	1. Reset operation

communication fail	E-16	1. The host computer is not working properly . 2. The communication line is not working properly. 3. The communication expansion card F00.28 is not set correctly. 3. The communication parameter F13 group is not set correctly.	1. Check the host computer wiring 2. Check the communication connection line 3. Correctly set the communication expansion card type 4. Correctly set the communication parameters
Current detection fault	E-18	1. Check if the Hall device is abnormal 2. The driver board is abnormal	1. Replace the Hall device 2. Replace the driver board
Motor tuning failure	E-19	1. The motor parameters are not set according to the nameplate 2. The parameter identification process has timed out	1. Set the motor parameters correctly according to the nameplate 2. Check the leads from the inverter to the motor
EEPROM read and write failure	E-21	1. EEPROM chip is damaged	1. Replace the main control board
Inverter hardware failure	E-22	1. Overvoltage exists 2. Overcurrent exists	1. Handle according to overvoltage fault 2. Handle according to overcurrent fault
Accumulated running time reaches fault	E-26	1. The cumulative running time reaches the set value	1. Use parameter initialization function to clear record information
User defined fault 1	E-27	1. Input the signal of user-defined fault 1 through multi-function terminal X	1. Reset operation
User defined fault 2	E-28	1. Input the signal of user-defined fault 2 through multi-function terminal X	1. Reset operation
Accumulated power-on time reaches fault	E-29	1. The cumulative power-on time reaches the set value	1. Use parameter initialization function to clear record information

Load drop fault	E-30	1. The inverter operating current is less than F12-64	1. Check whether the load is detached or whether the F12-64 and F12-65 parameter settings are consistent with the actual operating conditions.
feedback loss fault during operation	E-31	1. PID feedback is less than the setting value of F09.26	1. Check the PID feedback signal or set F09.26 to a suitable value.
Wave-by-wave current limiting fault	E-40	1. Is the load too large or the motor is blocked? 2. The inverter is too small.	1. Reduce the load and check the motor and mechanical conditions . 2. Choose a frequency converter with a higher power rating.
Speed deviation is too large	E-42	1. No parameter identification was performed. 2. The speed deviation is too large. The detection parameters F12.68 ~ F12.69 are set unreasonably.	1. Perform motor parameter identification 2. Reasonably set detection parameters according to actual conditions
Initial position error	E-51	1. The motor parameters deviate too much from the actual ones	1. Reconfirm whether the motor parameters are correct, and pay special attention to whether the rated current is set too small.
Master-slave control slave failure	E-55	The slave fails. Check the slave.	Start troubleshooting according to the slave fault code
Brake pipe protection failure	E-60	The brake resistor is short-circuited or the brake module is abnormal.	Check the brake resistor or seek technical support
Photovoltaic water shortage detection fault	E-65	Photovoltaic water pump water shortage detection fault	See the description of F16.10～F16.26 for details

Common faults and their solutions

Serial number	Fault phenomenon	Possible Causes	Solution
1	No display after power on	The grid voltage is not available or is too low; the switch power supply on the inverter drive board is faulty; the rectifier bridge is damaged; the inverter buffer resistor is damaged; the control board or keyboard is faulty; the connection between the control board and the drive board or keyboard is broken	Check the input power supply; check the bus voltage; seek service from the manufacturer;
2	"P.OFF" is displayed after power on	The connection between the drive board and the control board is poor; the related components on the control board are damaged; the motor or motor line is short-circuited to the ground; Hall fault; the grid voltage is too low	Seek manufacturer services;
3	The inverter displays normal after power-on. After running, it displays "P.OFF" and stops immediately.	The fan is damaged or blocked; the peripheral control terminal wiring is short-circuited;	Replace the fan; eliminate external short circuit fault;
4	Frequent E-14 (module overheating) faults	The carrier frequency is set too high. The fan is damaged or the air duct is blocked. The internal components of the inverter are damaged (thermocouple or other)	Reduce the carrier frequency (F00.15); replace the fan, clean the air duct; seek service from the manufacturer;
5	The motor does not rotate after the inverter is running.	Motor and motor line; Incorrect inverter parameter settings (motor parameters); Poor contact between the drive board and the control board; Drive board failure;	Reconfirm the connection between the inverter and the motor; replace the motor or eliminate the mechanical fault; check and reset the motor parameters;
6	X terminal fails.	Parameter setting error; external signal error; control board failure;	Check and reset the relevant parameters of group F07; reconnect the external signal

			line; seek service from the manufacturer;
7	The inverter frequently reports overcurrent and overvoltage faults.	The motor parameters are incorrectly set; the acceleration and deceleration time is inappropriate; the load fluctuates;	Reset motor parameters or perform motor tuning; set appropriate acceleration and deceleration time; seek manufacturer service;
8	All digital tubes light up when powered on	Related components on the control board are damaged;	Replace the control board;

Appendix 1: Modbus Communication Protocol

The SY3000 series inverter provides RS485 communication interface and supports Modbus-RTU slave communication protocol.
Computer or PLC realizes centralized control, sets the inverter operation command through this communication protocol, modifies or reads the function code parameters, Get the working status and fault information of the inverter.

1. Contents of the Agreement

The serial communication protocol defines the information content and format used in serial communication. It includes: host polling (or broadcasting)
Format: The encoding method of the host, including: the function code of the required action, the transmission data and error checking, etc. The response of the slave
It also uses the same structure, including: action confirmation, return data and error checking, etc.
If an error occurs or the action requested by the host cannot be completed, it will organize a fault message as a response to the host.

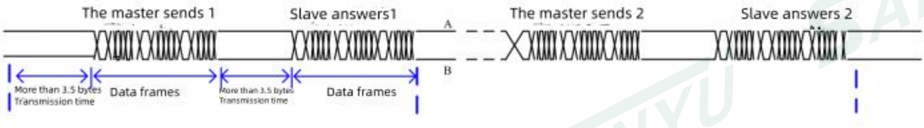
2. Application

The inverter is connected to a "single master and multiple slaves" PC/PLC control network with RS485 bus as a communication slave.

3. Bus structure

(1) Hardware interface
The inverter terminals 485+ and 485- are Modbus communication interfaces.
(2) Topological structure
Single host and multiple slave systems. Each communication device in the network has a unique slave address. One of the devices acts as the communication host (usually a PC host, PLC, HMI, etc.), actively initiates communication, and performs parameter read or write operations on the slave. The other devices act as communication slaves, responding to the host's inquiries or communication operations on the local device. Only one device can send data at the same time, while the other devices are in the receiving state. The setting range of the slave address is 1 to 247, and 0 is the broadcast communication address. The slave address in the network must be unique.
(3) Communication transmission method

Asynchronous serial, half-duplex transmission mode. In the process of serial asynchronous communication, data is sent in the form of messages, one frame of data at a time. The MODBUS-RTU protocol stipulates that when the idle time without data on the communication data line is greater than the transmission time of 3.5 bytes, it indicates the start of a new communication frame.

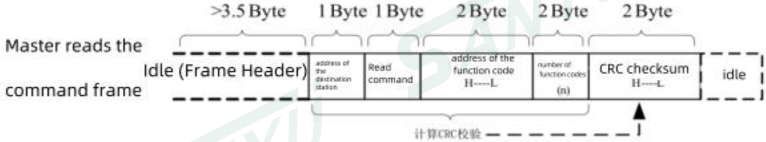


The built-in communication protocol of the SY3000 series inverter is the Modbus-RTU slave communication protocol, which can respond to the host's "query/command", or take corresponding actions according to the host's "query/command", and communicate data responses.

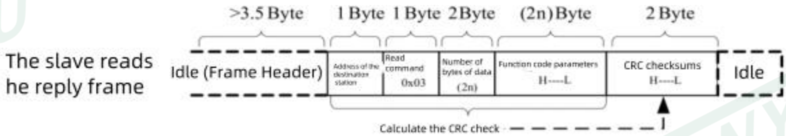
The host can refer to a personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc. The host can communicate with a slave individually, and can also issue broadcast information to all subordinate slaves. For the host's individual access "query/command", the accessed slave must return a response frame; for the broadcast information sent by the host, the slave does not need to feedback the response to the host.

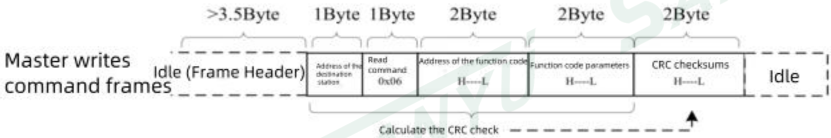
4. Communication data structure

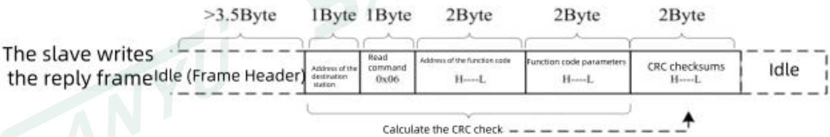
SY3000 series inverter is as follows. The inverter only supports the reading or writing of Word type parameters. The corresponding communication read operation command is Ox03; the write operation command is 0x06. It does not support byte or bit read and write operations:



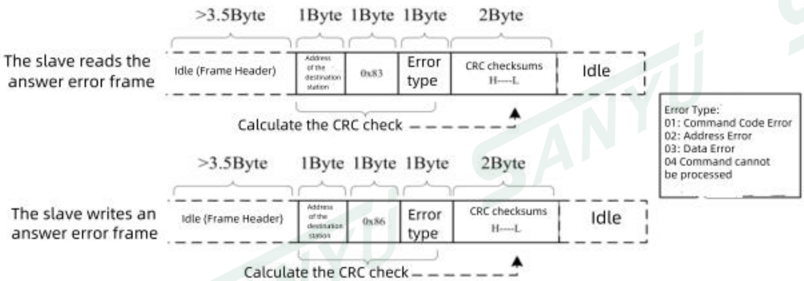
Theoretically, the host computer can read several consecutive function codes at one time (that is, n can be up to 12 at most), but be careful not to skip the last function code of this function code group, otherwise an error will be reported.







If the slave detects a communication frame error, or read/write failures due to other reasons, it will reply with an error frame.



Data frame field description:

Frame header START	Idle time greater than 3.5 character transmission times

Slave address ADR	Communication address range: 1 ~ 247; 0 = broadcast address
Command code CMD	03: Read slave parameters; 06: Write slave parameters
Function code address H	The parameter address inside the inverter is expressed in hexadecimal. It is divided into functional code type and non-functional code type (such as operating status parameters, operating commands, etc.) parameters, etc. For details, see the address definition. When transmitting, the high byte is in front and the low byte is in the back.
Function code address L	
Function code number H	The number of function codes read in this frame. If it is 1, it means that 1 function code is read. When transmitting, the high byte is in front and the low byte is in the back. This protocol can only rewrite 1 function code at a time, and there is no such field.
Function code number L	
Data H	The response data, or the data to be written, is transmitted with the high byte first and the low byte last.
Data L	
CRC CHK high	Test value: CRC16 check value. When transmitting, the high byte is in front and the low byte is in the back. For the calculation method, please refer to the description of CRC check in this section.
CRC CHK low	
END	3.5 characters

CRC verification method:

CRC (Cyclical Redundancy Check) uses the RTU frame format, and the message includes an error detection field based on the CRC method. The CRC field detects the content of the entire message. The CRC field is two bytes, containing a 16-bit binary value. It is calculated by the transmission device and added to the message. The receiving device recalculates the CRC of the received message and compares it with the value in the received CRC field. If the two CRC values are not equal, it means that there is an error in the transmission.

CRC is first stored in 0xFFFF, and then a process is called to process the continuous 8-bit bytes in the message with the value in the current register. Only the 8-bit data in each character is valid for CRC, and the start bit, stop bit and parity bit are invalid. During the CRC generation process, each 8-bit character is XORed with the register content alone, and the result moves toward the least significant bit, and the most significant bit is filled with 0. The LSB is extracted for detection. If the LSB is 1, the register is XORed with the preset value alone. If the LSB is 0, it is not performed. The whole process is repeated 8 times. After the last bit (the 8th bit) is completed, the next 8-bit byte is XORed with the current value of the register alone. The final value in the register is the CRC value after all bytes in the message are executed.

When CRC is added to the message, the low byte is added first, then the high byte. The CRC simple function is as follows:

```
unsigned int crc_chk_value (unsigned char *data_value, unsigned char length)
{
  unsigned int crc_value=0xFFFF;
  int i;
```

```
    while（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);
  }
```

4. Address definition of communication parameters

Read and write function code parameters (some function codes cannot be changed and are only used by manufacturers or for monitoring):

The rule of using function code group number and label as parameter address is as follows:

High byte: F00 to FFF (F group), d00 (d group)

Low byte: 00 ~ FF

For example: if you want to range function code F00.20, the access address of the function code is expressed as 0xF014;

Notice:

Some parameters cannot be changed when the inverter is in operation; some parameters cannot be changed regardless of the inverter state; when changing function code parameters, pay attention to the parameter range, unit and related instructions.

Function code group number	Communication access address	Communication modifies the function code address in RAM
F0 0 ～ F 15 Group	0xA000 ～ 0xAFFF	0x4000 ～ 0x4FFF
F 16 Group～ F 18 Group	0xB000 ～ 0xB2FF	0x 50 00 ～ 0x 52 FF
F FF Group	0x CF 00 to 0x CF FF	0x 6F 00 ～ 0x 6F FF
d0 0 group	0x7000 to 0x70FF	

Note that since EEPROM is frequently stored, the service life of EEPROM will be reduced. Therefore, some function codes do not need to be stored in the communication mode. You only need to change the value in RAM.

5. Shutdown/operation parameters section:

Parameter address	Parameter Description	Parameter address	Parameter Description
1000H	* Communication setting value (decimal) -10000 to 10000	1010H	PID Settings
1001H	Operating frequency	1011H	PID Feedback

1002H	bus voltage	1012H	PLC Steps
1003H	The output voltage	1013H	PULSE input pulse frequency, unit 0.01kHz
1004H	Output current	1014H	Feedback speed, unit: 0.1Hz
1005H	Output Power	1015H	Remaining running time
1006H	Output torque	1016H	AI1 voltage before correction
1007H	Running speed	1017H	AI2 voltage before correction
1008H	Digital input terminal input mark	1018H	Panel potentiometer voltage before calibration
1009H	Digital output terminal output mark	1019H	Line speed
100AH	AI1 voltage	101AH	Current power-on time
100BH	AI2 voltage	101BH	Current running time
100CH	Panel potentiometer voltage	101CH	PULSE input pulse frequency, unit 1Hz
100DH	Count value input	101DH	Communication setting value
100EH	Length value input	101EH	Actual feedback speed
100FH	Load speed	101FH	Main frequency A display
–	–	1020H	Auxiliary frequency B display

Notice:
The communication setting value is a percentage of the relative value, 10000 corresponds to 100.00%, -10000 corresponds to -100.00%.
Control command input to the inverter: (write only)

Command word address	Function
2000H	0001: Forward operation
	0002: Reverse operation
	0003: Forward jog
	0004: Reverse jog
	0005: Free stop
	0006: Deceleration and stop
	0007: Fault reset

Read inverter status: (read only)

Status word address	Status word function
3000H	0001: Forward operation
	0002: Reverse operation
	0003: Shutdown

Parameter lock password verification: (If the return value is 8888H, it means the password verification has passed)

User password address	Enter the password content
A F00H	*****

Parameter initialization:

Command address	Command content
A F0 1 H	0～ FFFF means 0～ 65535

Digital output terminal control: (write only)

Command address	Command content
2001H	BIT0: Y 1 output control BIT1: Y 2 output control BIT2: R 1 output control BIT3: R 2 output control

Analog output AO1 control: (write only)

Command address	Command content
2002H	0 to 7FFF represents 0% to 100%

Analog output AO2 control: (write only)

Command address	Command content
2003H	0 to 7FFF represents 0% to 100%

Pulse (PULSE) output control: (write only)

Command address	Command content
2004H	0 to 7FFF represents 0% to 100%

5、Inverter fault description:

Inverter fault address	Inverter fault information	
8000H	0000: No fault 0001: Reserved 0002: Acceleration overcurrent 0003: Deceleration overcurrent 0004: Constant speed overcurrent 0005: Acceleration overvoltage 0006: Deceleration overvoltage 0007: Constant speed overvoltage 0008: Buffer resistor overload fault 0009: Undervoltage fault 000A: Inverter overload 000B: Motor overload 000C: Input phase loss 000D: Output phase loss 000E: Module overheat 000F: External fault 0010: Communication abnormality 0011:	0015: Parameter read and write abnormality 0016: Inverter hardware fault 0017: Reserved 0018: Reserved 0019: Reserved 001A: Running time reached 001B: User-defined fault 1 001C: User-defined fault 2 001D: Power-on time reached 001E: Load loss 001F: PID feedback lost during operation 0028: Fast current limiting timeout fault 002A: Speed deviation is too large 005C: Initial position error

	Reserved 0012: Current detection fault 0013: Motor tuning fault 0014: Reserved	0041: Photovoltaic water shortage detection fault

6. Meaning of error code when slave responds to abnormal information:

Error code address	error code	illustrate
8001 H	01H	wrong password
	02H	Read and write command errors
	03H	CRC check error
	04H	Invalid address
	05H	Invalid parameters
	06H	Invalid parameter change
	07H	System Lock
	08H	Storing parameters

Appendix 2: Macro parameter setting instructions

Function macro definition	Setting parameters	Automatically modify parameter list	Debugging steps
One variable frequency pump + two industrial frequency pumps (one variable frequency pump + two industrial frequency pumps) water supply mode 1	F00.00 =1	F00.03=10; F14.02=11; F14.03=80; F14.04=2002; F14.05=11; F14.06=11; F07.00=53; F07.01=54; F08.02=42; F08.03=43; F08.04=44; F09.00=7.	Step 1: Determine the sensor feedback type. AI1 and AI2 are factory default input voltage feedback signals. You can also select AI1 input current feedback signal through jumper JP3. Step 2: Terminal wiring, if the pressure gauge has a 0-10V output, connect the pressure gauge signal line to AI1, and the other two lines to +10V and GND; if the output is 0-20mA, short-circuit COM and GND, connect the pressure gauge signal line to AI1, and the other line to 24V. For other terminal wiring, see Appendix 3 (Three-pump Circulation Soft Start Water Supply Parameter Description). Step 3: Parameter initialization (F15.01=2); Step 4: Set the sensor range (F16.09); Step 5: Function macro selection (F00.00=1 or 2) Step 6: Set the target pressure, which can be set through parameter F16.08 or by using the up and down keys on the keyboard.
Three-pump circulation soft start (3 variable frequency pumps) water supply mode	F00.00 =2		
One variable frequency pump + three industrial frequency pumps (1 variable frequency pump + 3 industrial frequency pumps) water supply mode	F00.00 =3	F00.03=10; F14.02=11; F14.03=80; F14.04=2002; F14.05=11; F14.06=11; F08.02=42; F08.03=43; F08.04=44; F09.00=7.	Step 1: Determine the sensor feedback type. AI1 and AI2 are factory default input voltage feedback signals. You can also select AI1 input current feedback signal through jumper JP3. Step 2: Terminal wiring. If the pressure gauge has a 0-10V output, connect the pressure gauge signal line to AI1, and the other two lines to +10V and GND. If the output is 0-20mA, short-circuit COM and GND, connect the pressure gauge signal line to AI1, and the other line to 24V. Step 3: Parameter initialization (F15.01 = 2);

One variable frequency pump + two industrial frequency pumps (one variable frequency pump + two industrial frequency pumps) water supply mode 2	F00.00 =4	F00.03=10; F14.02=11; F14.03=80; F14.04=2002; F14.05=11; F14.06=11; F08.02=42; F08.03=43; F09. 00=7.	Step 4: Set the sensor range (F16.09); Step 5: Function macro selection (F00.01=3, 4, 5, 6); Step 6: Set the target pressure, which can be set through parameter F16.08 or by using the up and down keys on the keyboard. Note: When F00.01=3, 4, 5, 6, there is no need to connect the interlocking circuit, and the contactor can be controlled through the main control board relay and Y terminal.
One variable frequency pump + one industrial frequency pump (one variable frequency pump + one industrial frequency pump) water supply mode	F00.00 =5	F00.03=10; F14.02=11; F14.03=80; F14.04=2002; F14.05=11; F14.06=11; F08.02=42; F09.00=7;	
Single pump water supply (1 variable frequency pump) mode	F00.00 =6	F00.03=10; F14.02=11; F14.03=80; F14.04=2002; F14.05=11; F14.06=11; F09.00=7.	
Photovoltaic water supply voltage tracking mode	F00.00 =7	F00.03=11; F00.17=7.5; F00.18=7.5.	Step 1: Parameter initialization (F15.01=2); Step 2: Function macro selection (F00.00=7, 8, 9). Note: For photovoltaic water supply, refer to F16.10 ~ F16.26.

Photovoltaic water supply power and VF mode	F00.00 =8		
Photovoltaic water supply power tracking SVC mode	F00.00 =9		

Appendix 3: Three-pump circulation soft start water supply parameter description

function code	name	Predetermined area	Factory settings	Change
F 00 . 00	Function macro definition	0: General mode 1: One variable frequency pump and two industrial frequency pumps (1 variable frequency pump + 2 industrial frequency pumps) water supply mode 1 2: Three-pump circulation soft start (3 variable frequency pumps) water supply mode	0	×
F00.02	Command source selection	1: Terminal operation command channel	0	×
F00.03	Main frequency source selection	10: Multi-pump instruction	0	×
F07 . 00	Input terminal X1 function	53: Start/Stop 54: Run allowed 55: Interlock 1 56: Interlock 2 57: Interlock 3 58: PFC start/stop	53	×
F07 . 01	Input terminal X2 function		54	×
F07 . 02	Input terminal X3 function		55	×
F07 . 03	Input terminal X4 function		56	×
F07 . 04	Input terminal X5 function		57	×
F07 . 05	Input terminal X6 function		58	×
F07 . 06	Input terminal X7 function		0	×
F 08 . 02	Programmable relay R1 output	42 : Interlock 1 output 43 : Interlock 2 output	42	×
F 08 .	Programmable		43	×

03	relay R2 output	44 : Interlock 3 output		
F 08 . 04	Open collector Y1 output function selection		44	×
F 08 . 05	Open collector Y 2 output function selection		0	×
F09.00	PID given source	0: F09.01 setting 1: AI1 2: AI2 3: Panel potentiometer 4: PULSE setting (X7) 5: Communication setting 6: Multi-segment command setting	0	☆
F09.01	PID value given	0.0% ～ 100.0%	50.0%	☆
F09.02	PID feedback source	0: AI1 1: AI2 2: Reserved 3: AI1-AI2 4: PULSE setting (X7) 5: Communication setting 6: AI1+AI2 7: MAX(|AI1|, |AI2|) 8: MIN(|AI1|, |AI2|)	0	☆
F09.03	PID action direction	0: Positive effect 1: Negative effect	0	☆
F09.04	PID given feedback range	0 ~ 65535	1000	☆
F09.05	Proportional gain Kp1	0.0 ～ 100.0	20.O	☆
F09.06	Integration time Ti1	0.01s ～ 10.00s	2.00s	☆
F09.07	Derivative time Td1	0.000s ～ 10.000s	0.000s	☆
F09.08	PID reverse cut-off frequency	0.00 ~ Maximum frequency	2.00Hz	☆
F09.09	PID deviation limit	0.0% ～ 100.0%	0.0%	☆
F09.10	PID differential limiting	0.00% ～ 100.00%	0.10%	☆
F09.11	PID given change time	0.00 ～ 650.00s	0.00s	☆
F09.12	PID feedback filter time	0.00 ～ 60.00s	0.00s	☆
F09.13	PID output filter time	0.00 ～ 60.00s	0.00s	☆
F09.26	PID feedback loss detection value	0.0%: Do not judge feedback loss 0.1% ~ 100.0%	0.0%	☆
F09.2	PID feedback loss	0.0s ～ 20.0s	0.0s	☆

7	detection time			
F16.00	Terminal connection and disconnection delay	0.0～6000.0s	0.1	☆
F16.01	Polling time	0.0～6000.0h	48.0	☆
F/16.02	Pump reduction lower frequency	0.0～600.00HZ	35.00	☆
F/16.03	Pump delay time	0.0～3600.0s	5.0	☆
F/16.04	Pump reduction delay time	0.0～3600.0s	5.0	☆
F/16.05	Pump sleep waiting time	0.0～3600.0s	2.0	☆
F/16.06	Water pump wake-up waiting time	0.0～3600.0s	1.0	☆
F/16.07	Water pump wake-up pressure point	(0.0～100.0%)*（F16.08）	80.0%	☆
F/16.08	Preset pressure	0.00～F16.09（MPa, Kg）	5.00	☆
F/16.09	Pressure gauge range	0.00～100.00（MPa、Kg）	10.00	☆

1. Instructions for use of one-change-two-function water supply mode 1 and three-pump circulation soft start water supply mode :

1、**One-in-two-in-one water supply mode 1** is that the inverter only starts the first inverter for speed regulation, and the others are directly connected to the power grid.

2、**The three-pump circulation soft-start water supply mode** is that the frequency converter starts each unit, and delays connecting to the power grid after starting; the first one started is connected to the power grid, and the later one is used for speed regulation.

2. The use of external terminals and the working process of the addition and subtraction pump are as follows:

1、**input terminals X1 to X6 are fixed at the factory.**

When F00.00 selects 1 or 2, input terminals X1 to X6 are fixed to their water supply function.

2、**Corresponding relationship between X terminal, Y terminal and relay**

When X3 is short-circuited with COM, it corresponds to interlock 1 output No. 42 in F08.02 ~ F08.05, which is referred to as pump No. 1 for the sake of convenience; when X4 is short-circuited with COM, it corresponds to interlock 2 output No. 43 in F08.02 ~ F08.05, which is referred to as pump No. 2; when X5 is short-circuited with COM, it corresponds to interlock 3 output No. 44 in F08.02 ~ F08.05, which is referred to as pump No. 3.

3、Differences between X1 and X6

X1 and X6 cannot be turned on at the same time. X1 is manually controlled start and stop. Only one pump can be started at a time. The frequency is given by AI1 and no PID adjustment is performed. X6 is controlled start and stop in multi-pump water supply mode and PID adjustment is performed.

4. Manual control of the pump start and stop process

After X1 and COM are short-circuited, the order of pump startup is that the first pump to be put into operation starts first, and the pumps that are put into operation together start smaller. For example, after only X5 is connected, only pump No. 3 is started; if X4 and X5 are connected at the same time, only pump No. 2 is started; if X3, X4 and X5 are connected at the same time, only pump No. 1 is started.

5. Working process of multi-pump water supply mode

After X6 and COM are short-circuited, the order of pump startup is that the first one put into operation starts first, and the ones put into operation together start smaller, and PID control is performed.

(1) When F00.01=1 (one variable two working water supply mode 1 is valid), if all three water pumps are put into operation, after the system is powered on, pump No. 1 is connected first and the variable frequency pump No. 1 is started. When the working frequency of variable frequency pump No. 1 reaches 50Hz, the pump adding time (F16.03) is delayed. If the measured pressure does not reach the system set pressure, the industrial frequency pump No. 2 is connected. When the working frequency of variable frequency pump No. 1 reaches 50Hz again, the pump adding time (F16.03) is delayed. If the measured pressure still does not reach the system set pressure, the industrial frequency pump No. 3 is connected. At this time, pump No. 1 is in variable frequency working state, and pumps No. 2 and No. 3 are in industrial frequency working state. If the measured pressure is greater than or equal to the system set pressure, the operating frequency of the No. 1 variable frequency pump drops to the lower limit frequency of the pump reduction (F16.02), and after the pump reduction delay (F16.04), the No. 3 industrial frequency pump will be disconnected. If the measured pressure is still greater than or equal to the system set pressure, and the operating frequency of the No. 1 variable frequency pump is less than or equal to the lower limit frequency of the pump reduction (F16.02), after the pump reduction delay (F16.04), the No. 2 industrial frequency pump will be disconnected, and finally only the No. 1 variable frequency pump will be working.

(2) When F00.01=2 (three-pump circulation soft start mode is valid), if all three water pumps are put into operation, after the system is powered on, pump No. 1 is connected first to start the variable frequency operation of pump No. 1. When pump No. 1 is working at 50Hz, after the pump delay (F16.03), if the measured pressure does not reach the system set pressure, pump No. 1 is disconnected, and pump No. 2 and power frequency pump No. 1 are connected. At this time, pump No. 1 is converted from variable frequency state to power frequency state, and pump No. 2 is in variable frequency working state. When pump No. 2 is working at 50Hz, after the pump delay (F16.03), if the measured pressure still does not reach the system set pressure, pump No. 2 is disconnected, and pump No. 3 and power frequency pump No. 2 are connected. At this time, pump No. 2 is converted from variable frequency state to power frequency state, pump No. 3 is in variable frequency working state, and pump No. 1 is still in power frequency working state. When the operating frequency of pump No. 3 drops to the lower limit frequency of pump reduction (F16.02), after the pump reduction delay (F16.04), if the measured pressure is greater than or equal to the system set pressure, the No. 1 industrial frequency pump will be disconnected; when the operating frequency of pump No. 3 is less than or equal to the lower limit frequency of pump reduction (F16.02), after the pump reduction delay (F16.04), if the measured pressure is still greater than or equal to the system set pressure, the No. 2 industrial frequency pump will be disconnected; finally, only the No. 3 variable frequency pump will work.

Note: If one-to-three is required, all three pumps will be put into operation; if one-to-two is required, any two pumps can be selected for operation; if one-to-one is required, any one pump can be selected for operation; all are started according to the rule that the pump that is put into operation first will be started first, and the pumps that are put into operation together will be started smaller.

6、Terminal connection and disconnection delay

Since there is a delay in the connection and disconnection of the contactor terminals, the signals are not synchronized, and the terminal input disconnection delay (F 16 . 00) is required for adjustment.

7. X2 terminal description.

X2 is the operation permission terminal. This terminal is connected to the normally closed point of the external fault relay. It is generally connected to the external water shortage or high voltage signal control. If there is no external fault detection, it needs to be short-circuited with COM.

Three， Application of STOP/RST key

1、The factory default value of F14.01 is 3, that is, the STOP/RST key is valid in the terminal control operation mode. If the keyboard is used to stop the machine, it is necessary to reconnect the X2 and X6 terminals or power on again to work normally.

2、When F14.01=0, the STOP/RST key is invalid under terminal control, and only the inverter fault is reset. Generally, F14.01 is set to 0 to prevent the keyboard from shutting down due to accidental operation. It is necessary to reconnect the X2 and X6 terminals or power on again to work normally.

Working process when there is a failure in water supply

1、If the variable frequency pump has an external fault, stop the faulty pump first, and then switch the next larger industrial frequency pump to the variable frequency pump. For example, pumps 1, 2, and 3 are all turned on, 2 is a variable frequency pump, and 1 and 3 are both industrial frequency. If a frequency converter fault occurs, stop pump 2 first, and then switch the industrial frequency of pump 3 to the variable frequency pump, while pump 1 continues to operate at industrial frequency. If the external fault of pump 3 is resolved, it can be put into use normally.

2. If an internal fault occurs in the frequency conversion pump, all pumps will stop. After resetting the frequency converter fault using the keyboard, the normal working state will be restored.

Function settings.

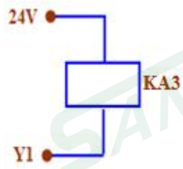
1、If you want to turn on the water supply function, you need to set F00.00 to option 1 or 2. For specific selections, please refer to the manual.

2、To enable the PID function, set F00.03=10, and then set the required PID parameters

in group F09. See the manual for details.
3. F14.01 is set to 0, which means the keyboard stop key is invalid.

Water supply wiring diagram (refer to ABB's inverter ACS510 constant pressure water supply wiring diagram).

1、Schematic diagram of open collector Y1 connected to relay:



2. Introduction to wiring diagram symbols

In the following Figures 1 and 2, **L1** a  ent coil power s  licates the normally closed terminal,

Indicates the n  erminal, Indica 

Indicates relay KA1 (R1 control on the mainboard)

The normally open point, 

Indicates the normally open point of relay KA2 (controlled by R2 on the main board), 

indicates the normally open point of relay KA3 (controlled by Y1 on the main board); KM1, KM2 and KM3 are contactors that control the No. 1, No. 2 and No. 3 variable frequency pumps respectively, and KM11,

KM21 and KM31 are contactors for controlling the No. 1, No. 2 and No. 3 power frequency pumps. **(Note: Figures 1 and 2 below are only sketch logic diagrams.**

Need a fault relay or indicator light, add it yourself)

3. Introduction to contactor interlocking and self-locking (as shown in Figure 1)

When KM1 is connected, KM11, KM2 and KM3 cannot be connected.
When KM11 is connected, KM1 cannot be connected.
When KM2 is connected, KM21, KM1 and KM3 cannot be connected.
When KM21 is connected, KM2 cannot be connected.
When KM3 is connected, KM31, KM1 and KM2 cannot be connected.
When KM31 is connected, KM3 cannot be connected

figure 1:

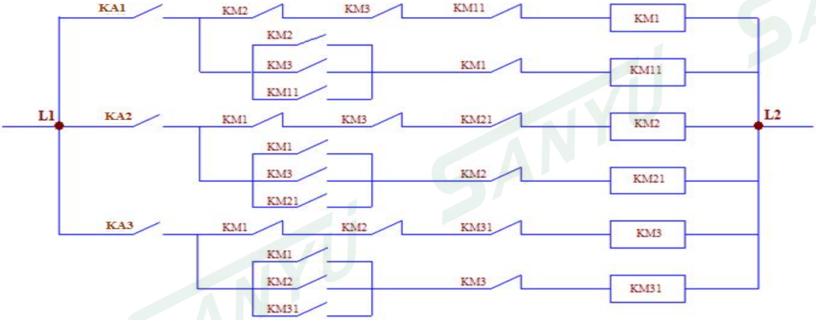
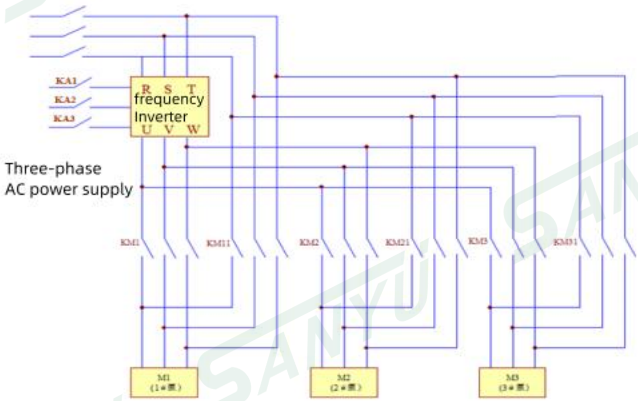

KA1
KM2
KM3
KM11
KM1
KM2
KM3
KM11
KM1
KM11
L1
KA2
KM1
KM3
KM21
KM2
L2
KM1
KM3
KM21
KM2
KM21
KA3
KM1
KM2
KM31
KM3
KM1
KM2
KM31
KM3
KM31

figure 2:


KA1
KA2
KA3
R S T
frequency
Inverter
U V W
Three-phase
AC power supply
KM1
KM11
KM2
KM21
KM3
KM31
M1
M2
M3

Warranty Agreement

1. The warranty period of this product is twelve months (subject to the barcode information on the body). During the warranty period, if the product fails or is damaged under normal use according to the instruction manual, our company will be responsible for free repair.

2 During the warranty period, if the damage is caused by the following reasons, a certain repair fee will be charged:

A. Damage to the machine caused by incorrect use or unauthorized repair or modification;
B. Machine damage caused by fire, flood, voltage abnormality, other natural disasters and secondary disasters;
C. Hardware damage caused by dropping or transportation after purchase;
D. Machine damage caused by failure to operate according to the user manual provided by our company;
E. Failure and damage caused by obstacles other than the machine (such as external equipment factors);

3. When the product fails or is damaged, please fill in the contents of the "Product Warranty Card" correctly and in detail.

4. The collection of maintenance fees shall be based on the latest "Maintenance Price List" adjusted by our company.

5. This warranty card will not be reissued under normal circumstances. Please be sure to keep this card and show it to the maintenance personnel during warranty service.

6 If you have any questions during the service process, please contact our agent or our company in time.

Warranty card

Customer Information	Unit Address:	
	company name: postal code:	Contact:
		contact number:
product information	Product number:	
	Body barcode (paste here):	
	Agent Name:	
accident details	(Maintenance time and content): Repair man:	

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