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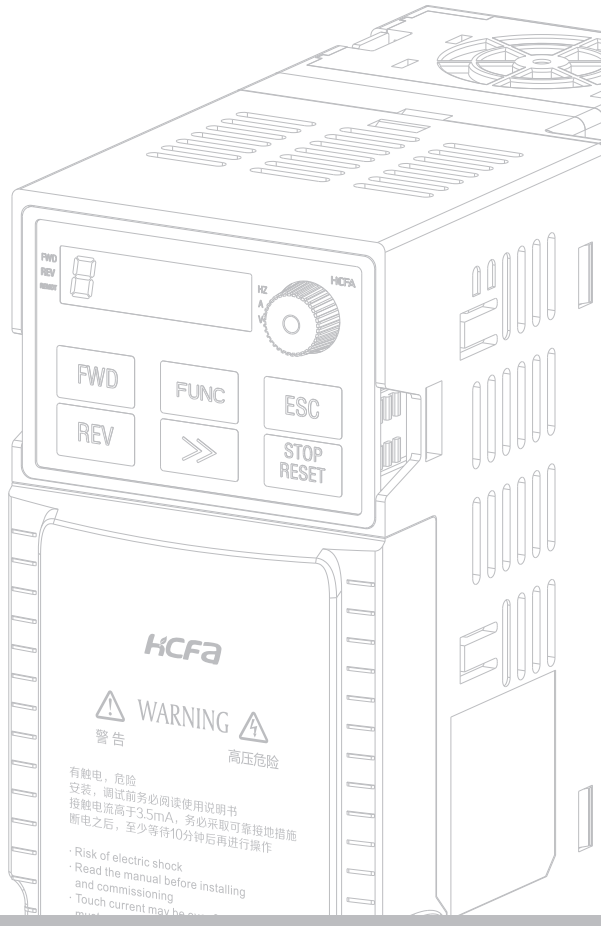
E-Series High-performance inverter

HC-E380/E220

User Manual



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Thank you for purchasing HCFA product

E-Series High-performance Inverter

HC-E380/E220 User Manual

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Preface

Thanks for purchasing E-series high-performance vector inverter! As a new generation of high-performance vector control, E-series inverter uses the industry-leading vector control algorithm which is widely used in the speed control of asynchronous motor and PMSM(Permanent magnet synchronous motor). With the overall design of electromagnetic

compatibility and optimized PWM control technology, the E-series inverter can satisfy the environmental protection requirements of low noise and low electromagnetic interference in applications. It has the ability of anti-tripping control and the ability to adapt to the place with bad grid, temperature, humidity and dust which can meet the requirements of various complex and high-precision driving applications and the requirements of higher reliability and better adaptability to the environment and help realize the professional and individual drive and control system solution. The E-series high-performance inverter has the following improvements:(The models with asterisk★needs the suitable extension module)

1) Control mode

High-performance V/F control(output torque 150% at low-frequency 0.5Hz), Sensorless vector control(support speed control and torque control), Feedback vector control(with torque control, need optional PG card).

2) All-new vector control algorithm

It introduces the advanced sensorless vector control that gives better low-speed stability, enhanced low-frequency loading capacity, and supports torque control.

3) Various functions

Support main frequency sources and auxiliary frequency sources, frequency source algorithm function and support up 16 frequencies. With simple PLC control, acceleration/deceleration curve support straight-line, S-curve, VF curve support straight-line VF, broken line VF and power function V/F curve, V/F separation, PID control and the wobble function, fixed length and counting.

4) Rich extension module

Multifunctional I/O extension card★, injection molding machine card ★, incremental encoder PG card★, rotary transformer PG card ★, Profibus-DP communication card★, CANopen communication card★, brakings

5) Multiple field buses

Support three field buses: Modbus-RTU、Profibus-DP★、CANopen.

This manual describes the correct use, including installation, wiring, rapid bebugging, parameter setting, troubleshooting and inspection and maintenance. Read and understand this manual carefully to guarantee correct installation, use and maintenance to deliver the inverter’ s performance sufficiently. Always forward it to the ender user and store it in a safer place for immediate use.

Upon unpacking, check:

Every inverter has gone through the strict factory tests before shipment. After the customer unpack the inverter, please perform the following inspection procedures:

- Any damage to the inverter during the transportation
- Whether the nameplate model and ratings are consistent with your order.
- The box contains the inverter, certificate of conformity, user manual

If you find any omission or damage, contact HCFA corporation or your supplier immediately.

First-time Use

For the users who use this product for the first time, read the manual carefully. If in doubt concerning some functions or performances, contact the technical support personnel of HCFA to ensure correct use.

E-series inverter comply with the following international standards and has been certificated by CE.

IEC/EN 61800-5-1：2003 Adjustable speed electrical power drive systems safety requirements

IEC/EN 61800-3：2004 Adjustable speed electrical power drive systems: Part 3: EMC standards and specific testing method;

I EC/EN 61000-2-1、2-2、3-2、3-3、4-2、4-3、4-4、4-5、4-6：EMC international and EU standards;

The inverter is subject to change for better improvements with notice.

Chapter 1 Safety Information and Precautions

1.1 Safety symbols

Before installation, operation, maintenance or inspection of this product, thoroughly read through and understand this manual and all of the associated manuals. Installation, commissioning or maintenance may be performed in conjunction with this chapter. HCFA corporation will assume no liability or responsibility for any injury or loss caused by improper operation. This manual classifies the safety precautions into two categories: “DANGER” and “WARNING”.

⚠DANGER
• Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

⚠WARNING
• Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

1.2 Safety precautions

1.2.1 Before installation

⚠DANGER
• Do not install the equipment if you find any water seepage on the inverter upon unpacking. • Do not install the equipment if you find component missing or damage upon unpacking. • Do not install the equipment if the nameplate does not conform to the product you received.

⚠DANGER
• Handle the equipment with care during transportation to prevent damage to the equipment • Do not touch the components with your hands. Failure to comply will result in static electricity damage.

1.2.2 During installation

⚠DANGER
• Install the equipment on incombustible objects such as metal, and keep it away from combustible materials. Failure to comply may result in a fire. • Tighten the screws and install the inverter as specified in this manual. Failure to do may cause a crash.

• Do not loosen the fixed screws of the components, especially the screws with red mark.

⚠WARNING
• Do not drop wire end or screw into the inverter. Failure to comply will result in damage to the inverter. • Install the inverter in places free of vibration and direct sunlight. • When two inverters are laid in the same cabinet, arrange the installation positions properly to ensure the cooling effect.

1.2.3 At Wiring

⚠DANGER
• Wiring must be performed only by qualified personnel under instructions described in this manual. Failure to comply may result in unexpected accidents. • A circuit breaker must be used to isolate the power supply and the inverter. Failure to comply may result in a fire. • Ensure that the power supply is cut off before wiring. Failure to comply may result in electric shock. • Ground the inverter properly by standard. . Failure to comply may result in electric shock. • Never connect the power cables to the output terminals (U,V, W) of the inverter. Pay attention to the marks of the wiring terminals and ensure correct wiring. Failure to comply will result in damage to the inverter. • Make sure to use wire sizes recommended in the manual and the wiring conform to the EMC requirements and safety standards. Failure to do so may cause some accidents. • Never connect the braking resistor between the DC bus terminals (+) and (-). Failure to comply may result in a fire. • Use the control line as described in this manual and shield cable for analog and high-speed pulse I/O line and ensure that the shielding layer is reliably grounded.

1.2.4 Before power-on

⚠DANGER
• All peripheral devices and cables must be connected properly under the instructions described in this manual. Failure to comply will result in accidents or damage to the inverter. • Make sure that the voltage level of inverter is in consistent with the power voltage. Failure to comply will result in accidents or damage to the inverter.

1.2.5 After power –on

⚠DANGER
• Do not open the inverter's cover after power-on. Failure to comply may result in electric shock. • Do not touch or operate the inverter with wet hand. Failure to comply may result in electric shock. • Do not touch any I/O terminal of the inverter or pull the cables. Failure to comply may result in electric shock and damage to the products. • Do not change the default settings of the inverter. Failure to comply will result in damage to the inverter. • Make sure the mechanical equipment is ready to start and the personnel are in the safety area of equipment before

operation. Failure to comply may result in products or physical damage.

• Do not touch the rotating part of the motor during the motor auto-tuning or running. Failure to comply will result in accidents.

1.2.6 Operations:

⚠DANGER
• Do not touch the fan or the brake resistor. Failure to comply will result in personal burnt. .• Signal detection must be performed only by qualified personnel during operation. Failure to comply will result in personal injury or damage to the Inverter

⚠WARNING
• Do not move the inverter or control cabinet. Avoid objects falling into the inverter when it is running. Failure to comply will result in damage to the inverter. • Start/stop the inverter by terminal or control methods in other control circuit. Avoid to start the inverter by power-on. Do not start/stop the Inverter by turning the contactor ON/OFF. Failure to comply will result in damage to the Inverter.

1.2.7 During maintenance

⚠DANGER
• Do not repair or maintain the inverter at power-on. Failure to comply will result in electric shock. • Repair or maintain the inverter about ten minutes after the Inverter is powered off. This allows for the residual voltage in the capacitor to discharge to a safe value. Failure to comply will result in personal injury. • Repair or maintenance of the inverter may be performed only by qualified personnel. Failure to comply will result in personal injury or damage to the inverter.. • All the components and optional accessories must be plugged or removed only after power-off.

1.3 General precautions

1.3.1 Motor insulation test

Perform the insulation test when the motor is used for the first time, or when it is reused after being stored for a long time, or in a regular check-up, in order to prevent the poor insulation of motor windings from damaging the inverter. The motor must be disconnected from the motor during the insulation test. A 500-V mega-Ohm meter is recommended for the test. The insulation resistance must not be less than 5 MΩ.

1.3.2 Thermal protection of motor

If the rated capacity of the motor selected does not match that of the inverter, especially when the inverter's rated power is greater than the motor's, adjust the motor protection parameters on the operation panel of the inverter or install a thermal relay in the motor circuit for protection.

1.3.3 Running at higher or lower frequency

The inverter can provide output frequency of 0 to 500Hz. If the inverter operates at a lower frequency for a long period, take special attention to the heat dissipation of the motor or use variable-frequency motor; When the inverter operates out of rated frequency of motor, consider the endurance capability of mechanical system at high speed to avoid shortening the service life of the equipment.

1.3.4 Vibration and resonance of mechanical system

The inverter may encounter the mechanical resonance point at acceleration/deceleration, which can be avoided by setting the skip frequency. When the operation frequency required by the user coincides with the mechanical resonance point, change the operation frequency or mechanical resonance point.

1.3.5 Motor heat and noise

The output of the inverter is pulse width modulation (PWM) wave with certain harmonic frequencies, and therefore, the motor temperature, noise, and vibration are slightly greater than those when the inverter runs at power frequency.

1.3.6 Voltage-sensitive device or capacitor on output side of the inverter

Do not install the capacitor for improving power factor or lightning protection voltage sensitive resistor on the output side of the inverter because the output of the inverter is PWM wave. Otherwise, the inverter may suffer transient overcurrent or even be damaged

1.3.7 Contactor at the I/O terminal of the inverter

When a contactor is installed between the input side of the inverter and the power supply, the inverter must not be started or stopped by switching the contactor on or off. If the inverter has to be operated by the contactor, ensure that the time interval between switching is at least one hour since frequent charge and discharge will shorten the service life of the capacitor inside the inverter.

When a contactor is installed between the output side of the inverter and the motor, do not turn off the contactor when the inverter is active. Otherwise, modules inside the inverter may be damaged.

1.3.8 When external voltage is out of rated voltage range

The inverter must not be used outside the allowable voltage range specified in this manual. Otherwise, the inverter's components may be damaged. If required, use a corresponding voltage step-up or step-down device.

1.3.9 Prohibition of three-phase input changed into two-phase input

Do not change the three-phase input of the inverter into two-phase input. Otherwise, a fault will result or the inverter will be damaged.

1.3.10 Surge suppressor

The inverter has a built-in voltage dependent resistor (VDR) for suppressing the surge voltage generated when the inductive loads (electromagnetic contactor, electromagnetic relay, solenoid valve, electromagnetic coil and electromagnetic brake) around the inverter are switched on or off. If the inductive loads generate a very high surge voltage, use a surge suppressor for the inductive load or also use a diode.

1.3.11 Altitude and de-rating

In places where the altitude is above 1000 m and the cooling effect reduces due to thin air, it is necessary to de-rate the inverter.

1.3.12 Common DC bus

When multiple inverters need to be used at the same time, the common DC bus can be used to save the electrical energy. E-series inverter support common DC bus. Make sure the common DC bus is used for the inverter with the same power or similar power, failure to comply may damage the inverter.

1.3.13 Disposal

The electrolytic capacitors on the main circuits and PCB may explode when they are burnt. Poisonous gas is generated when the plastic parts are burnt. Treat them as ordinary industrial waste.

1.3.14 Adaptable motor

①The standard adaptable motor is adaptable four-pole squirrel-cage asynchronous induction motor or PMSM. For other types of motor, select a proper inverter according to the rated motor current.

②The cooling fan and rotor shaft of non-variable-frequency motor are coaxial, which results in reduced cooling effect when the rotational speed declines. If variable speed is required, add a more powerful fan or replace it with variable-frequency motor in applications where the motor overheats easily.

③The standard parameters of the adaptable motor have been configured inside the inverter. It is still necessary to perform motor auto-tuning or modify the default values based on actual conditions. Otherwise, the running result and protection performance will be affected.

④The inverter may alarm or even be damaged when short-circuit exists on cables or inside the motor. Therefore, perform insulation short-circuit test when the motor and cables are newly installed or during routine maintenance. During the test, make sure that the inverter is disconnected from the tested parts

Chapter 2 Product information

2.1 Designation rules

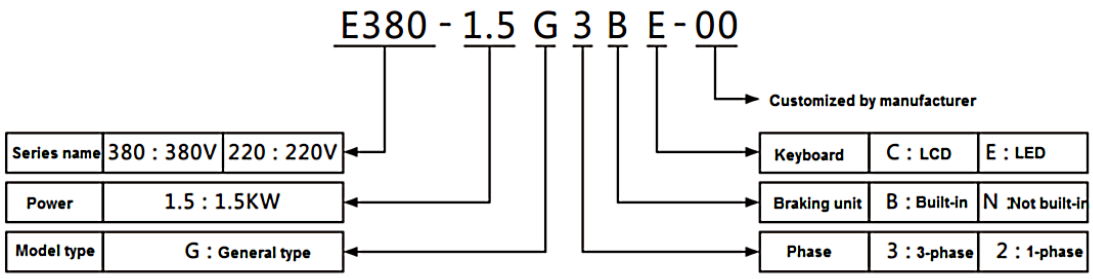


Figure 2-1 Designation rules

2.2 Nameplate description

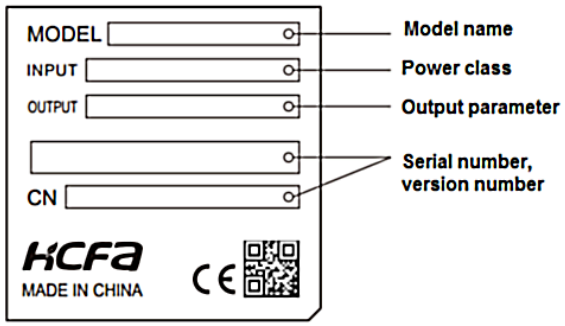


Figure 2-2 Nameplate description

⚠WARNING
• The barcode on the nameplate of each model is the only mark that identifies the manufacturing details, which is important for after-sale service.

2.3 Product series

Table 2-1 Product specifications and technical data

Model name	Power capacity kVA	Input current A	Output current A	Applicable motor	
				kW	HP
1-phase: 220V(-15%~+20%)，50/60Hz					
E220-0. 75G2BE-00	1. 5	8. 2	4. 0	0. 75	1
E220-1. 5G2BE-00	3. 0	14	7. 0	1. 5	2
E220-2. 2G2BE-00	4. 0	23	9. 6	2. 2	3
3-phase: 220V(-15%~+20%)，50/60Hz					
E220-0. 75G3BE-00	3. 0	5. 0	4. 0	0. 75	1
E220-1. 5G3BE-00	4. 0	8.0	7. 0	1. 5	2
E220-2. 2G3BE-00	6. 0	10. 5	9. 6	2. 2	3
E220-3. 7G3BE-00	8. 9	14. 6	13	3. 7	5
3-phase: 380V(-15%~+20%)，50/60Hz					
E380-0. 75G3BE-00	1. 5	3. 4	2. 1	0. 75	1
E380-1. 5G3BE-00	3. 0	5. 0	3. 7	1. 5	2
E380-2. 2G3BE-00	4. 0	5. 8	5. 0	2. 2	3
E380-3. 7G3BE-00	5. 9	10. 5	9. 0	3. 7	5
E380-5. 5G3BE-00	8. 9	14. 6	13. 0	5. 5	7. 5
E380-7. 5G3BE-00	11. 0	20. 5	17. 0	7. 5	10
E380-11G3BE-00	17. 0	26. 0	25. 0	11. 0	15
E380-15G3BE-00	21. 0	35. 0	32. 0	15. 0	20
E380-18. 5G3BE-00	24. 0	38. 5	37. 0	18. 5	25
E380-22G3BE-00	30. 0	46. 5	45. 0	22	30
E380-30G3NE-00	40. 0	62. 0	60. 0	30	40
E380-37G3NE-00	50. 0	76. 0	75. 0	37	50
E380-30G3BE-00	40. 0	62. 0	60. 0	30	40
E380-37G3BE-00	50. 0	76. 0	75. 0	37	50

2.4 Technical specifications

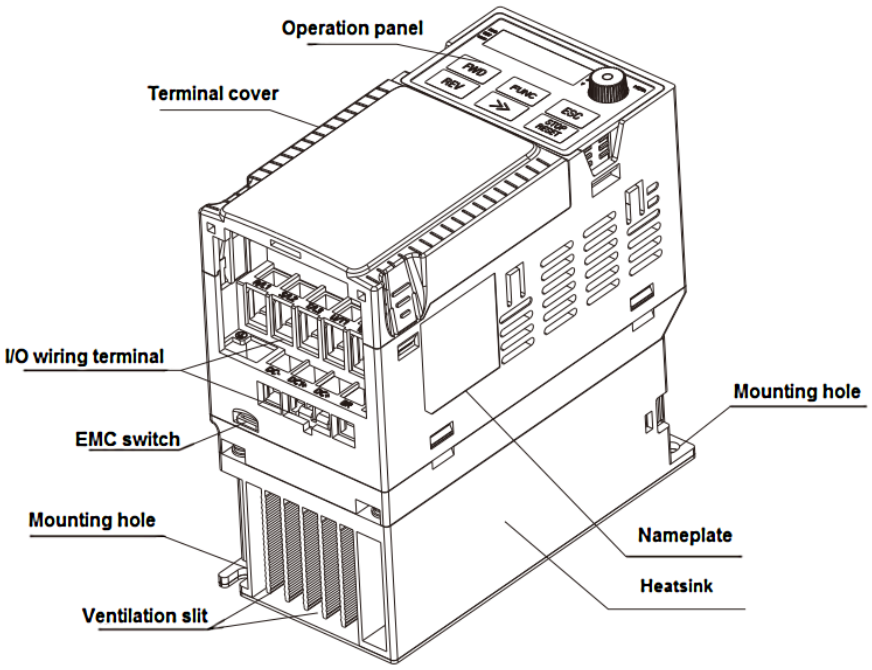
Items		Specifications
Power	Rated input voltage	1-phase 220V: 220V~240V, Constant voltage fluctuation ±10%, transient fluctuation -15%~+10%

		3-phase 220V: 220V~240V, Constant voltage fluctuation ±10%, transient fluctuation -15%~+10% 3-phase 380V: 380V~480V, Constant voltage fluctuation ±10%, transient fluctuation -15%~+10% that is 323V~528V; Voltage imbalance <3%, in accordance with IEC61800-2	
	Rated input current	Refer to Table 2-1	
	Rated frequency	50Hz/60Hz, fluctuation range ±5%	
Power output	Applicable motor	Refer to Table 2-1	
	Rated capacity	Refer to Table 2-1	
	Rated current	Refer to Table 2-1	
	Output voltage	Three-phase, 0V to the rated voltage, error less than ±3%	
Standard functions	Max. frequency	0Hz~500Hz, 0Hz~3200Hz can be customized by user	
	Carrier frequency	1. 0kHz~16. 0kHz, can be adjusted automatically	
	Input frequency resolution	0. 01Hz (Digital setting)	
	Control mode	No PG vector speed control, No PG vector torque control★, PG vector speed control★, PG vector torque control★, V/F control	
	Startup torque	0. 25Hz/150% (No PG vector)	0Hz/180% (PG vector) ★
	Speed range	1: 100 (No PG vector)	1: 1000 (PG vector) ★
	Speed stability accuracy	±0. 5% (No PG vector)	±0. 02% (PG vector) ★
	Torque control accuracy	±5% (PG vector) ★	
	Overload capacity	60s for 150% rated current, 1s for 200% rated current	
	Torque boost	Automatic boost; Customized boost 0.1 % to 30.0 %	
	Acceleration/deceleration curve	Straight-line or S-curve. Four kinds of acceleration/deceleration time, range : 0. 0s~6500. 0s	
	DC braking	DC braking frequency: 0Hz to max. frequency, DC injection braking active time: 0.0s to 60.0s. Current level of DC injection braking: 0% to 100%	
	Jog running	JOG frequency range: 0.00 Hz P00.08; JOG acceleration/deceleration time: 0.0–6500.0s	
	Onboard multiple preset speeds	It implements up to 16 speeds via the simple PLC function or combination of DI terminal states	
	Onboard PID	It realizes process-controlled closed loop control system easily.	
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically when the mains voltage changes	
	Overcurrent suppression	The system limits the output current automatically when the load changes in V/F operation.	
	Rapid current limit	The function helps to avoid frequent overcurrent faults to guarantee the inverter operate normally..	
	Overvoltage stall control	The system limits the energy feedback automatically during operation to prevent frequent or excessive trips when frequency changes.	
	Oscillation suppression	Optimize the V/F oscillation suppression to keep the stable operation	
— n	Power dip ride-through	Load feedback energy compensates for any voltage reduction, allowing the drive to continue	

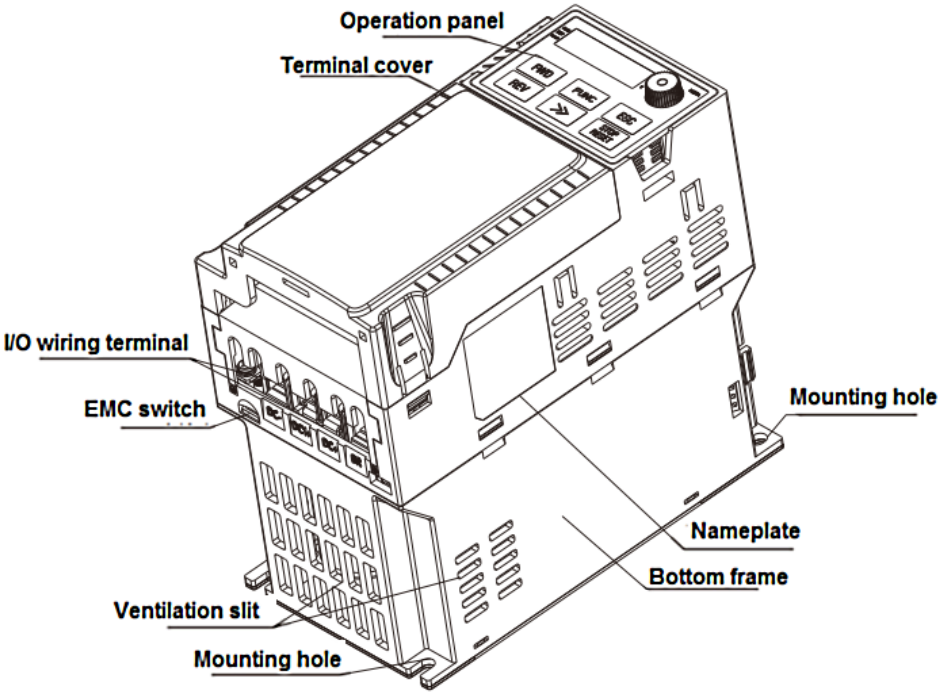
		to operate for a short time during power dips
	Timing control	Time range: 0.0–6500.0 minutes
	Multi-motor switchover	The drive have two groups of motor parameters and can control up to two motors.
	Field bus	Modbus-RTU、Profibus-DP★、CANopen★
	Motor overheat protection	The optional I/O extension card ★enables AI3 to receive the motor temperature sensor input (PT100, PT1000) ★ so as to realize motor overheat protection
	Multiple encoder types	Support incremental encoder ★ and rotary transformer★
RUN	Command source	Different methods of switching, such as Operating panel, Terminal I/O control, Serial communication
	Frequency source A	Supports up to 10 frequency sources and allows different methods of switching: Digital setting, Analog voltage reference, Analog current reference, Pulse reference, Communication reference.
	Frequency source B	Supports 9 frequency sources, and allows fine tuning of the auxiliary frequency and main& auxiliary calculation.
	Input terminals	Standard: 7 digital input (DI) terminals, one of which supports up to 100kHz high-speed pulse input. 3 analog input (AI) terminals: AI1: Support 0 to10V voltage input AI2: Support 0 to 10V voltage input or 0 to 20mA current input AI3: Support -10 to 10V voltage input Expanded capacity★: Can be customized by user’ s requirements
	Output terminals	Standard: 2 analog output terminal, support 0 to 10V voltage output or 0(or 4) to 20mA current output 2 digital output terminal, one of which supports high-speed pulse output terminal for a square-wave signal output in the frequency 0 to 100kHz 1 relay output terminal Expanded capacity: Can be customized by user’ s requirements
Display and operation on panel	LED display	Show parameters
	LCD display	Optional★
	Parameter copy	Parameters can be copied rapidly by the LCD operation panel.
	Key locking and function selection	It can lock the keys partially or completely and define the function range of some keys so as to prevent mis-function.
	Protection mode	Motor short-circuit detection at power-on, input/output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheat protection and overload protection
	Optional parts	LCD operation panel★, braking unit, I/O extension card ★, Profi bus-DP communication card★, CANopen communication card★, incremental encoder PG card★, rotary transformer PG card ★
Envir onm	Installation location	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapour, drip or salt

	Altitude	Lower than 1000 m (de-rated if the altitude is above 1000m)
	Ambient temperature	－10°C~＋40 °C(de-rated if the ambient temperature is between 40°C and 50°C)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9 m/s² (0.6 g)
	Storage temperature	-20°C to +60°C
Protection level		IP020
Cooling		Forced air cooling
Note: Consult HCFA corporation for the items with ★, which may not be supported temporarily.		

2.5 Product appearance and main structure



1. 5KW or less



2. 2~7. 5KW

Figure 2-3 Product appearance and main structure

2.6 Product installation size

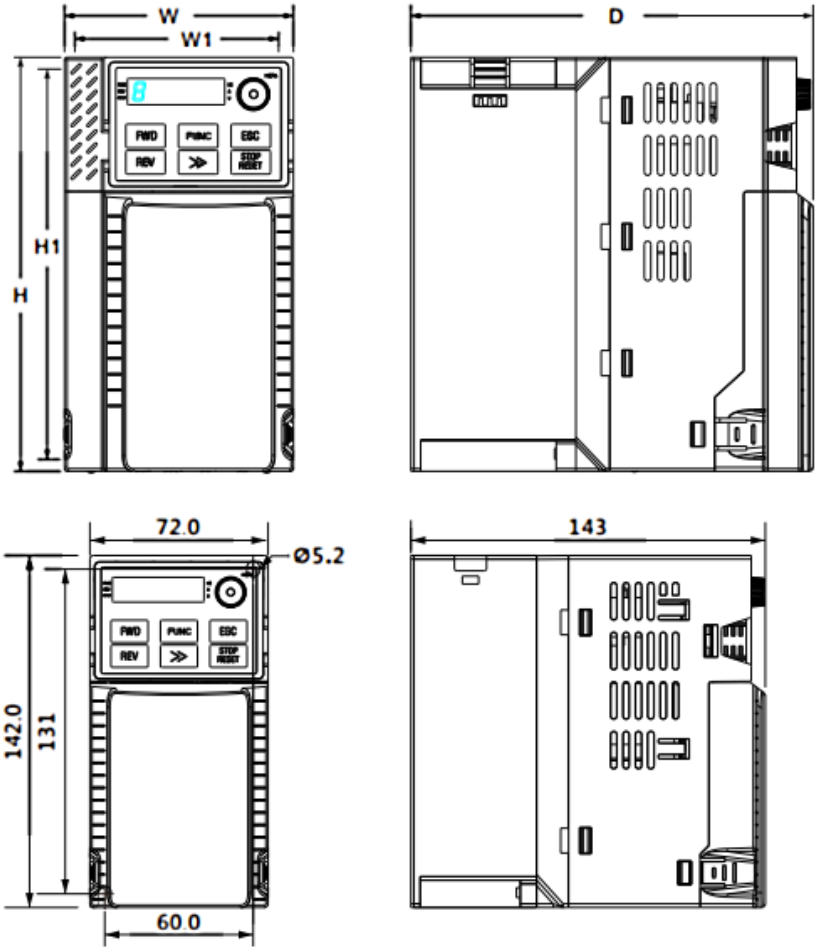


Figure 2-4 Product size for 1. 5KW inverter

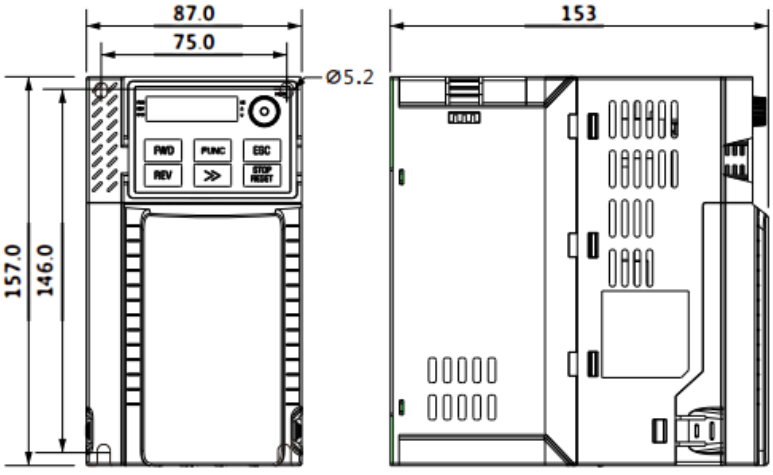


Figure 2-5 Product size for 3. 7KW inverter

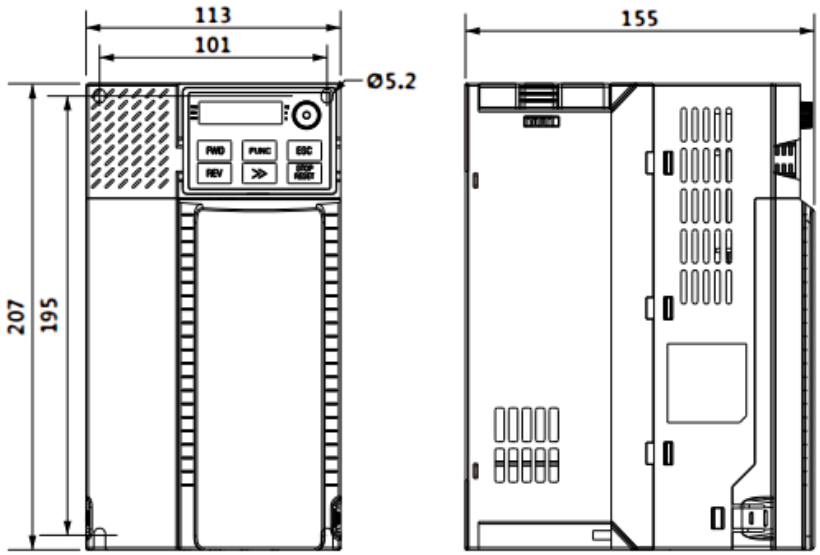


Figure 2-6 Product size for 7. 5KW inverter

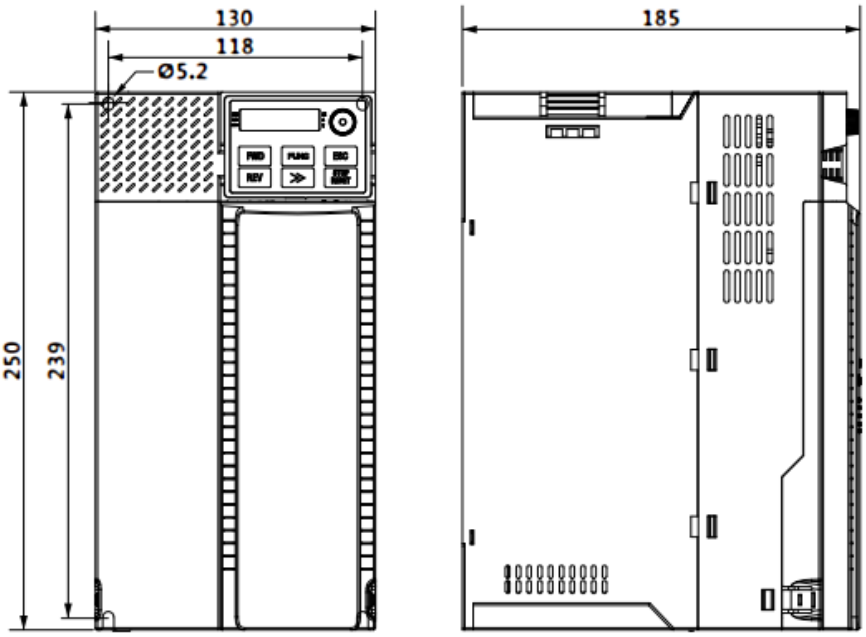


Figure 2-7 Product size for 15KW inverter

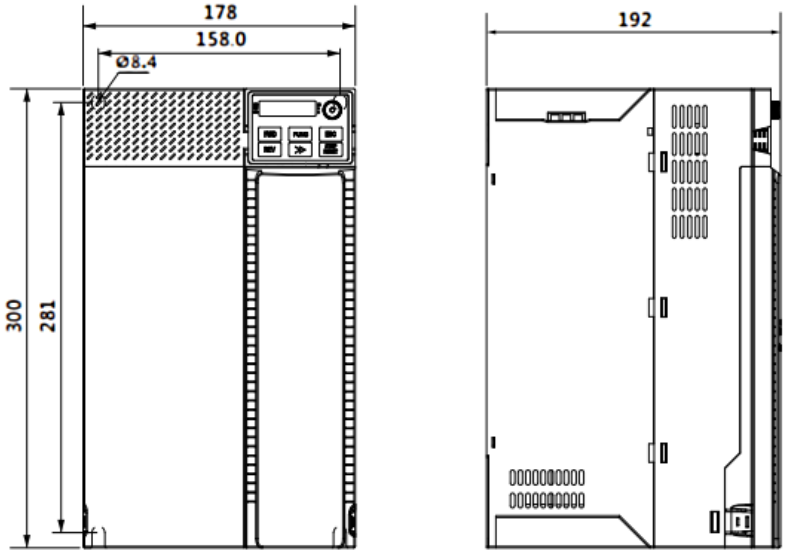


Figure 2-8 Product size for 22KW inverter

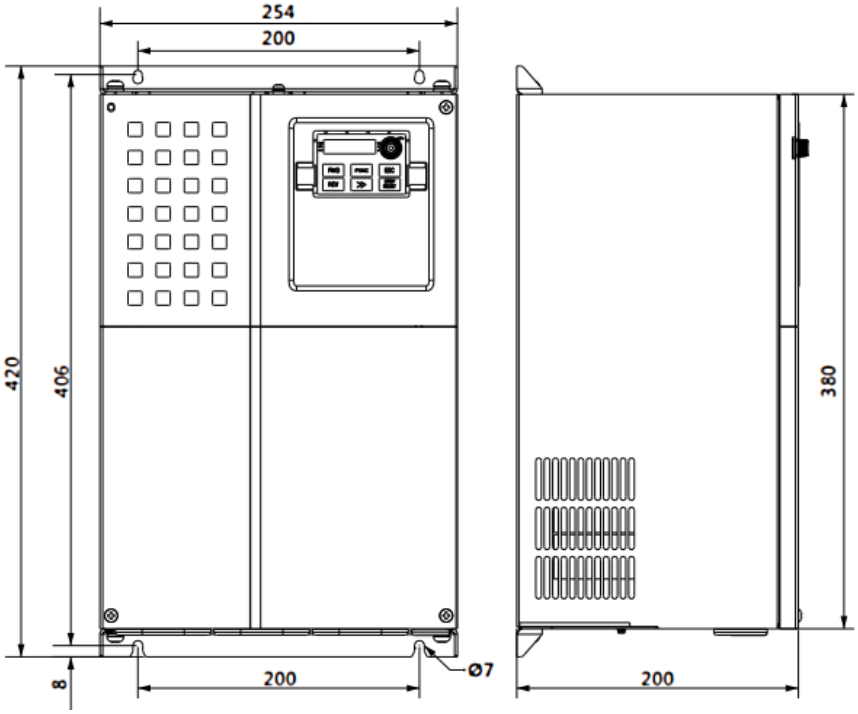


Figure 2-9 Product size for 37KW inverter

Table 2-3 Product size and installation dimension

Model	Mounting hole mm		External dimension mm			Mounting hole	Weight kg
	W1	H1	H	W	D		
Single-phase 220V，50/60Hz							
E220-0.75G2BE-00 E220-1.5G2BE-00	60	131	142（wall-mounting）	72	143	5.2	2
E220-2.2G2BE-00	75	146	157（wall-mounting）	87	153	5.2	3
Three-phase 220V，50/60Hz							
E220-0.75G3BE-00	60	131	142（wall-mounting）	72	143	5.2	2
E220-1.5G3BE-00							

E220-2.2G3BE-00 E220-3.7G3BE-00	75	146	157（wall-mounting）	87	153	5.2	3
Three-phase 380V，50/60Hz							
E380-0.75G3BE-00 E380-1.5G3BE-00	60	131	142（wall-mounting	72	143	5.2	2
E380-2.2G3BE-00 E380-3.7G3BE-00	75	146	157（wall-mounting	87	153	5.2	3
E380-5.5G3BE-00 E380-7.5G3BE-00	101	195	207（wall-mounting	113	155	5.2	5
E380-11G3BE-00 E380-15G3BE-00	118	239	250（wall-mounting	130	185	5.5	8
E380-18.5G3BE-00 E380-22G3BE-00	158	281	300（wall-mounting	178	192	8.4	10
E380-30G3NE-00 E380-37G3NE-00	195	335	350（wall-mounting	225	192	6	15
E380-30G3BE-00 E380-37G3BE-00	195	335	350（wall-mounting	225	192	6	15

2.7 Operation panel and cutout dimensions

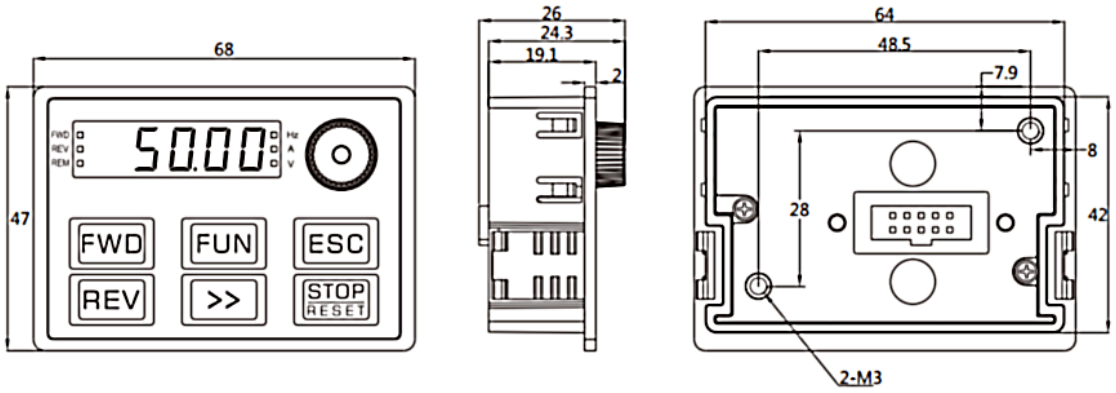


Figure 2-9 External dimension for LED panel

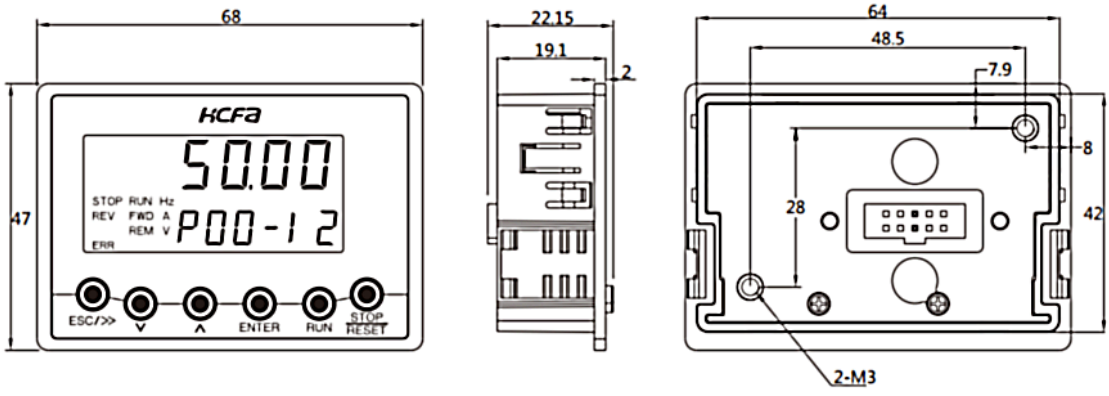
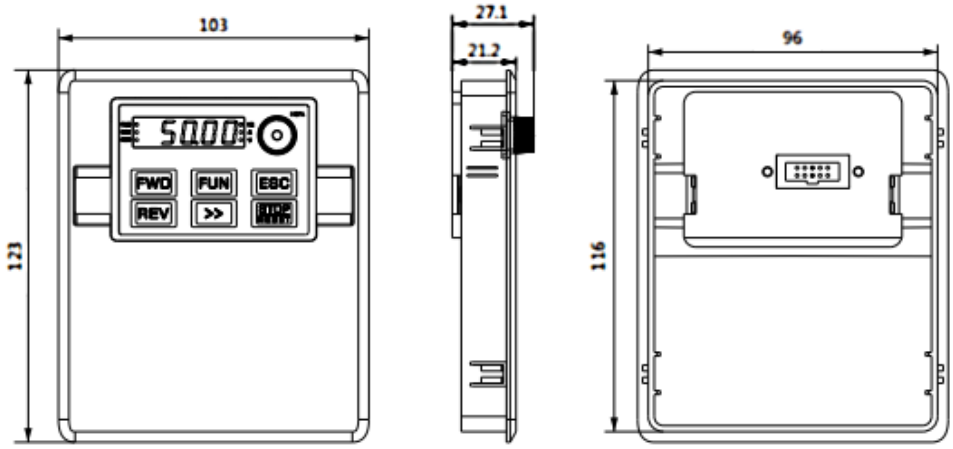
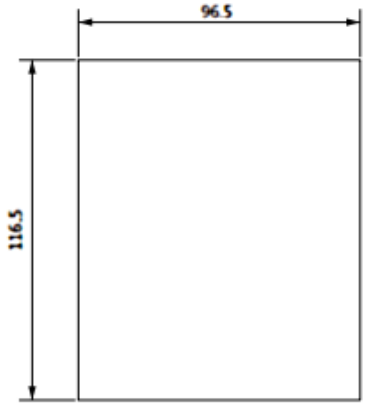


Figure 2-10 External dimension for LCD panel

The cutout dimensions for installation is shown as Figure 2-11 when no external tray. The best thickness for opening sheet is 1.2mm.



Tray dimensions



Cutout dimension for tray(Thickness for opening sheet 1.0 ~1.2mm)

Figure 2-11 Cutout dimension for external keyboard and tray

⚠WARNING
•The machine is equipped with LED panel and support external extension. Make notes when purchasing and the external extension cable can be provided. •LCD panel is optional and can be extended externally.

2.8 Selection of braking unit

2.8.1 Physical dimensions

The motor and load's regenerative energy is almost completely consumed on the braking resistor when braking.

According to the formula U*U/R=BR:

U refers to the braking voltage at system stable braking.

Different systems select different braking voltages. The 380 VAC system usually selects 700 V braking voltage. The 220 VAC system usually selects 380 V braking voltage

BR refers to the braking power.

2.8.2 Selection of power of braking resistor

In theory, the power of the braking resistor is consistent with the braking power. But in consideration that the de-rating is 70%, you can calculate the power of the braking resistor according to the formula 0. 7*Pr=BR*D.

Pr refers to the power of resistor

D refers to the braking frequency (percentage of the regenerative process to the whole working process)

Application	Elevator	Winding and unwinding	Centrifuge	Occasional braking load	General application
Braking Frequency	20%–30%	20%–30%	50%–60%	5%	10%

Table 2-4 Recommended values of braking resistor

Single-phase 220V 50/60Hz				
E220-0.75G2BE-00	150W	⩾80Ω	Built-in	No special description
E220-1.5G2BE-00	150W	⩾50Ω		
E220-2.2G2BE-00	250W	⩾50Ω		
Three-phase 220V 50/60Hz				
E220-0.75G3BE-00	150W	⩾80Ω	Built-in	No special description
E220-1.5G3BE-00	150W	⩾50Ω		
E220-2.2G3BE-00	250W	⩾50Ω		
E220-3.7G3BE-00	300W	⩾30Ω		
Three-phase 380V 50/60Hz				
E380-0.75G3BE-00	150W	⩾150Ω	Built-in	No special description
E380-1.5G3BE-00	150W	⩾150Ω		
E380-2.2G3BE-00	250W	⩾100Ω		
E380-3.7G3BE-00	300W	⩾80Ω		
E380-5.5G3BE-00	400W	⩾40Ω		
E380-7.5G3BE-00	500W	⩾30Ω		
E380-11G3BE-00	800W	⩾25Ω		
E380-15G3BE-00	1000W	⩾25Ω		
E380-18.5G3BE-00	1300W	⩾20Ω		
E380-22G3BE-00	1500W	⩾20Ω		
E380-30G3NE-00	2500W	⩾16Ω	No brake	No special
E380-37G3NE-00	3.7kW	⩾16Ω		
E380-30G3BE-00	2500W	⩾16Ω	Built-in	No special
E380-37G3BE-00	3.7kW	⩾16Ω		

⚠WARNING

- Table 2-4 above provides data for reference. You can select different resistance and power based on actual needs. However, the resistance must not be lower than the recommended value. The power may be higher than the recommended value
- The braking resistor model is dependent on the generation power of the motor in the actual system and is also related to the system inertia, deceleration time and potential energy load.
- For systems with high inertia, and/or rapid deceleration times, or frequent braking sequences, the braking resistor with higher power and lower resistance value should be selected.

2.9 Routine repair and maintenance

The influence of the ambient temperature, humidity, dust and vibration will cause the aging of the devices in the inverter, which may cause potential faults or reduce the service life of the inverter. Therefore, it is necessary to carry out routine and periodic maintenance every 3 to 6 month.

2.9.1 Routine inspection

⚠WARNING
• Whether the temperature is higher than before during operation • Whether the motor sounds abnormally or vibrates excessively during running • Check whether the current is same to the usual or within the permissible range. • Check whether the cooling fan is clogged or dirty. • Check whether the color of main circuit terminals changes or rust and if there’ s discharge between the I/O • Whether the housing is too hot, the PCB or copper is clogged by oil and metallic powder come into the inverter. • Check whether ventilation and heatsink are clogged and the cooling fan operates normally if the inverter is installed in the control cabinet.

2.9.2 Periodic maintenance

⚠WARNING
• Clean the ventilation slit periodically and replace the cooling fan in the inverter or control cabinet if the fan slow down or stop • Check whether the screws in the main circuit or control circuit loosen and overheat on the board • Check the insulation performance of the motor and main circuit cable periodically. • Non-professional technical personnel or untrained operators must not perform maintenance and replacement of devices. Failure to comply may cause physical damage or personal injury. • Do not perform the insulation test to the inverter. Make sure to disconnect the inverter when having the insulation test for motor and cable. Failure to comply may damage the inverter. • If insulation test must be performed, short-circuit all the I/O terminal (L、N、R、S、T、U、V、W、DC1+、DC+、BR、DC-） on the main circuit and test with 500V mega. • Do not measure the terminal of control circuit. Failure to do may damage the inverter.

2.9.3 Replacement of vulnerable components

Some components in the inverter will wear out or degrade in performance during use. It is necessary to have the maintenance and replace the vulnerable components to keep the inverter operate steadily and reliably. The vulnerable components of the inverter are cooling fan and filter electrolytic capacitor. Their service life is related to the operating environment and maintenance status.

⚠WARNING
• Generally, the cooling fan of inverter should be replaced in 2 to 3 years. • Generally, the electrolytic capacitor should be replaced in 4 to 5 years.

2.9.4 Storage of the inverter

For storage of the inverter, pay attention to the following aspects:

⚠WARNING
• Do not store the inverter in the places with high temperature, humidity, vibration or metallic powder and keep good ventilation. • Long-term storage degrades the electrolytic capacitor. • If not use for a long time, the inverter must be energized once every 2 years, each time lasting at least 5 hours. The input voltage must be increased slowly to the rated value with the regulator.

2.10 Warranty Agreement

HCFA Corporation will provide 18-month warranty (starting from the leave-factory date on the barcode) for the failure or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.

⚠WARNING
• Free warranty only applies to the inverter itself • Make sure to keep the packaging material of the inverter for convenient use of movement and maintenance in the future.

①Reasonable repair expenses will be charged for the damages due to the following causes even though in the warranty period.

②Improper operation without following the instructions or out of the specified range

③The user repair or modify the machine without permission

④Improper storage or maintenance

⑤Using the inverter for non-recommended function

⑥Fire, flood, salt corrosion, corrosive gas, earthquake, storm, lightening or abnormal voltage

⑦The maintenance fee is charged according to HCFA's uniform standard. If there is an agreement, the agreement prevails.

Chapter 3 Mechanical and Electrical Installation

3.1 Installation environment

The ambient temperature should be around -10°C~40°C. When temperature exceeds 40°C, the external forced cooling or de-rating is required.

Install the inverter on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation.

Chapter 3 Mechanical and Electrical Installation

3.1 Installation environment

The ambient temperature should be around -10°C~40°C. When temperature exceeds 40°C, the external forced cooling or de-rating is required.
Install the inverter on the surface of an incombustible object, and ensure that there is sufficient space around for heat dissipation.

Free from the direct sun.
Free from the location with high humidity and condensation, humidity less than 95%
Free from the vibration(less than 5. 9m/s^2（0. 6g）)
Free from oil dirt, dust and metal powder
Free from corrosive, explosive and combustible gas.

3.2 Installation direction and clearance

Install the inverter indoors, with good ventilation, and generally vertically. The installation clearance that need to be reserved is shown as in Figure 3-1.

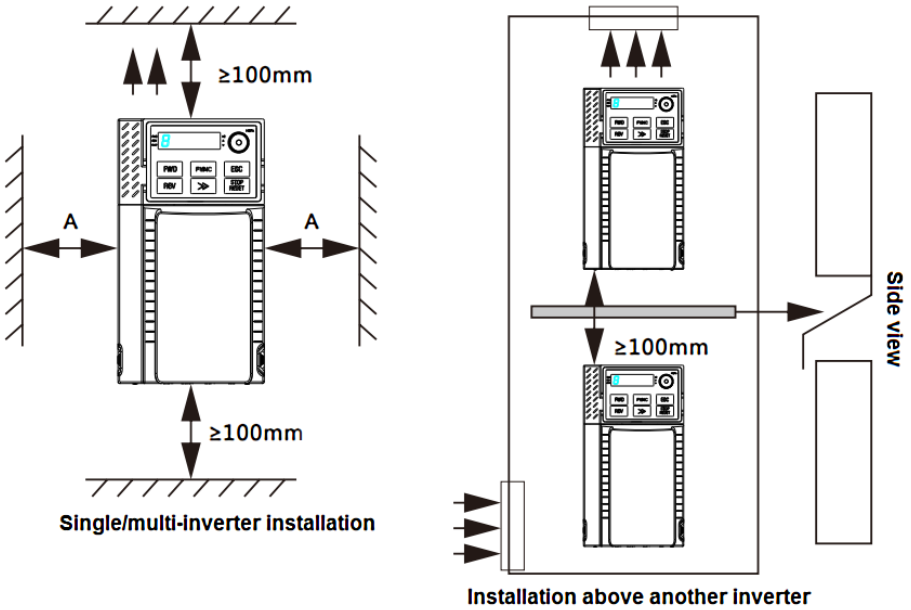


Figure 3-1 Mounting clearance

When single inverter installed: Do not consider the clearance A when power is less than 15kW. Clearance A should be greater than 50mm if power exceed 15kW.

When installed on another inverter: If inverter needs to be installed above another one, install an insulation guide plate.

Power class	When installed on another inverter	
	B	A
⩽15kW	⩾100mm	⩾50mm
18. 5kW—30kW	⩾200mm	
⩾37kW	⩾300mm	

3.3 Remove and reinstall the operation panel and front panel

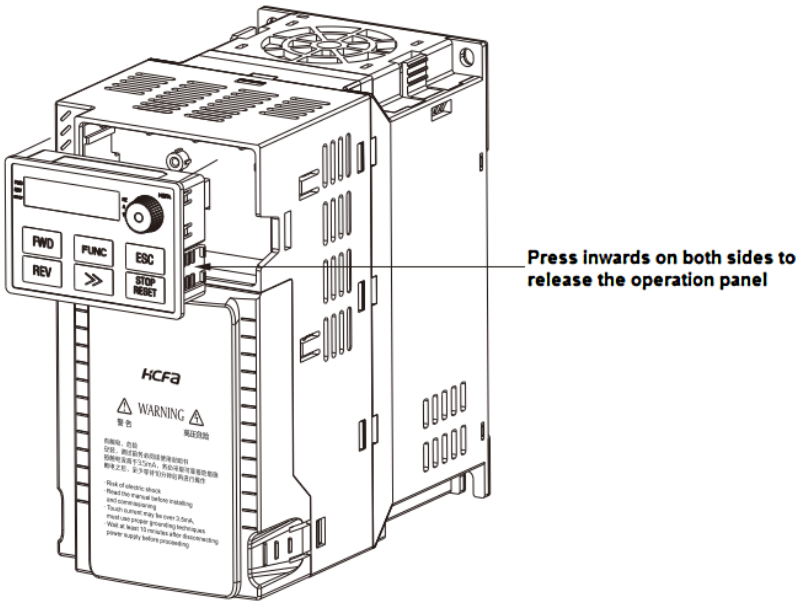


Figure 3-2 Remove and reinstall the operation panel

Remove the operation panel: Put the middle finger to the slot at the upper side of operation panel and press inwards on both sides to release the operation panel.

Reinstall the operation panel: Locate the mounting hook of operation panel to the mounting slot, and press on the upper side with middle finger until the side latches are in place..

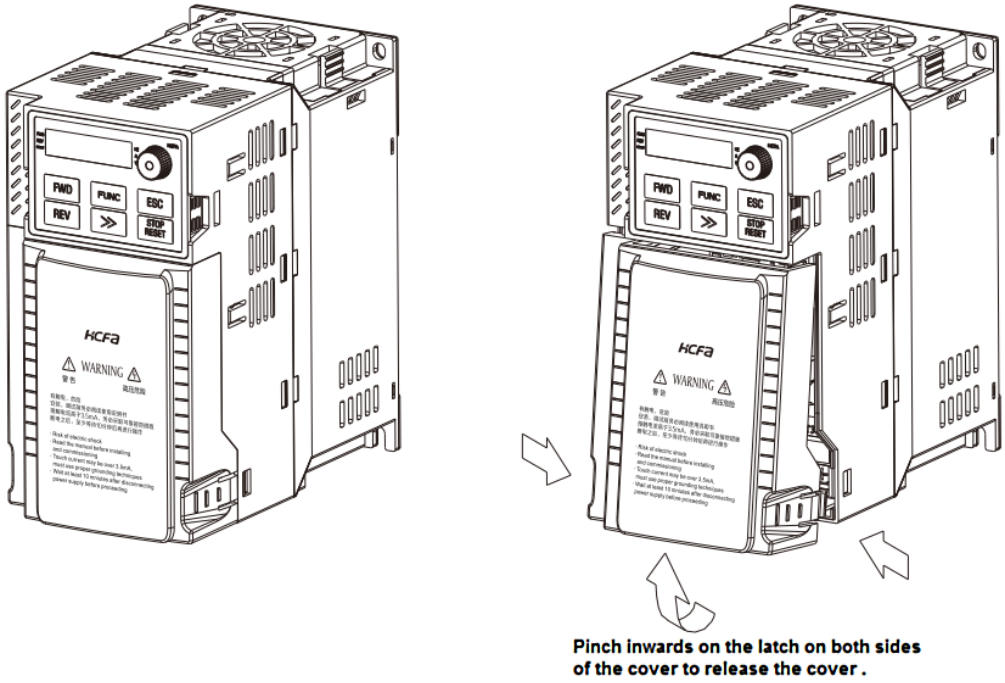


Figure 3-3 Remove and reinstall the front cover (plastic housing)

Remove the cover: Pinch inwards with fingers or tools on the latch on both sides of the cover to release the cover

Reinstall the cover: Locate the cover top at its fixing position. Align the front cover to the inverter and push it down until

the side latches are in place.

3.4 Connection with peripheral devices

3.4.1 Connection diagram with peripheral devices

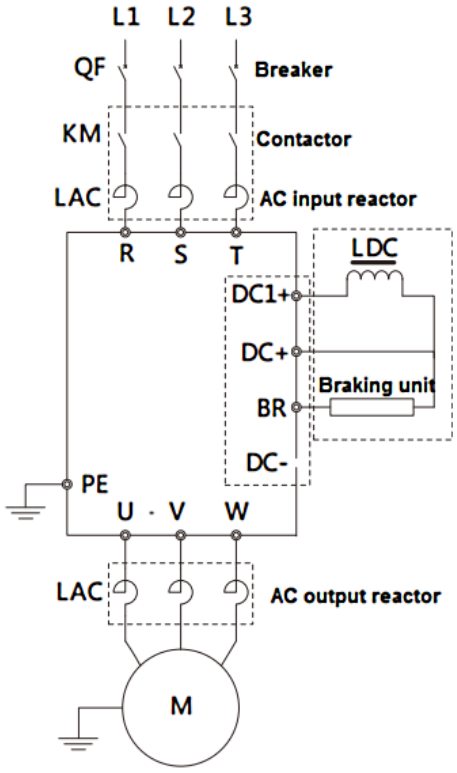


Figure 3-4 Connection with peripheral devices

Table 3-1 Description of peripheral electrical devices

Breaker	The separation switch must be installed between the grid and inverter to ensure the personal safety during equipment maintenance. The capacity of the circuit breaker is 1. 5 ~ 2 times of the rated current of the inverter. Take the time characteristics of inverter overload protection into consideration for the time characteristics of breaker.
Leakage breaker	Potentially leakage current may occur as the inverter output the high-frequency pulse voltage. Install the leakage breaker at the inverter input side. The specified leakage breaker B-type is recommended and the leakage current setting value is300mA.
Delay-time fuse	The delay-time fuse must be used at the inverter input side in North America(the rated current of fuse is 225%, mas load output current) to avoid the fault extension due to the equipment malfunction. Refer to Tale 3-2 for the selection of Fuse.
Contactor	Do not start and stop the inverter frequently by switching the contactor on and off (less than ten times per minute) nor use it to directly start the inverter. To prevent the overheat damage of braking resistor, install a thermal protection relay for braking resistor overheat test.

Input AC/DC reactor	1. The power supply capacity of inverter is greater than 600kVA; 2. On the same power supply, there is the reactive power compensation capacitor or phase control load, where large current may occur, which may damage the components. 3. When the voltage unbalance at 3-phase power supply exceeds 3%, some components at the conversion may be damaged. 4. Improve the power factor of the input side. When the above situation occurs, please connect the AC reactor to the input side of the inverter or install the DC reactor on the bus side
Input filter	Reduce the noise input to the inverter from power end or output to the power end from the inverter
Thermal relay	Although inverter built-in the motor overload protection function, but when the inverter drives two or more motor or multipolar motor, please install thermal protection relay between the inverter and each motor to prevent motor overheat.
Output filter	Connect the filter to the output side to decrease the conduction and radiation interference.
Output AC reactor	When the cable between the inverter and motor exceeds 100m, it is recommended to install the AC output reactor to suppress high-frequency oscillation, which helps to avoid the insulation damage to the motor and overcurrent.
Braking unit	The models of 22kW or less is built-in braking resistor.
Grounding	As the current leakage may occur, to ensure the safe use of inverter and motor, Resistance value of the ground cable must be less than 10Ω. The cable should be as short as possible and wire diameter conforms to the standards of Table 3-3. Note: The value in the table is correct only when the two conductors use the same metal. If not, the area of the protective conductor should be determined using the equivalent conductivity method.

Table 3-2 Recommended fuse capacity and copper core insulated wire section

Power	Lead-in line Fuse（A）	Power	Lead-in line protection Fuse（A）	Power	Lead-in line protection Fuse（A）
7.5 kW	20	75 kW	200	280 kW	800
11 kW	32	90 kW	250	315 kW	1000
15 kW	35	110 kW	315	355 kW	1000
18.5 kW	50	132 kW	400	400 kW	1250
22 kW	63	160 kW	450	450 kW	1500
30 kW	80	185 kW	560	500 kW	1800
37 kW	100	200 kW	560	560 kW	2000
45 kW	125	220 kW	630		
55 kW	160	250 kW	800		

Table 3-3 Section area of conductor

Section area S（mm^2）	Minimum section area Sp（mm^2）
S≤16	S
16＜S≤35	16
35＜S	S/2

3.4.2 Selection of peripheral devices

Table 3-4 Selection of MCCB, conductor and wire

Model name	MCCB (A)	Contactor (A)	Main circuit input wire (mm^2)	Main circuit output wire	Control circuit wire (mm^2)
1-phase 220V 50/60Hz					
E220-0.75G2BE-00	16	12	0.75	0.75	0.5
E220-1.5G2BE-00	25	18	1.5	1.5	0.5
E220-2.2G2BE-00	32	25	2.5	2.5	0.5
3-phase 220V 50/60Hz					
E220-0.75G3BE-00	10	9	0.75	0.75	0.5
E220-1.5G3BE-00	10	9	0.75	0.75	0.5
E220-2.2G3BE-00	16	12	1.5	1.5	0.5
E220-3.7G3BE-00	20	18	2.5	2.5	0.5
3-phase 380V 50/60Hz					
E380-0.75G3BE-00	10	10	0.75	0.75	0.5
E380-1.5G3BE-00	16	10	0.75	0.75	0.5
E380-2.2G3BE-00	16	10	0.75	0.75	0.5
E380-3.7G3BE-00	25	16	1.5	1.5	0.5
E380-5.5G3BE-00	32	25	2.5	2.5	0.5
E380-7.5G3BE-00	40	32	4.0	4.0	0.75
E380-11G3BE-00	63	40	4.0	4.0	0.75
E380-15G3BE-00	63	40	6.0	6.0	0.75
E380-18.5G3BE-00	100	63	6	6	1.0
E380-22G3BE-00	100	63	10	10	1.0
E380-30G3NE-00	125	100	16	10	1.0
E380-37G3NE-00	160	100	16	16	1.0
E380-30G3BE-00	125	100	16	10	1.0
E380-37G3BE-00	160	100	16	16	1.0

Table 3-5 Selection of I/O AC reactor, DC reactor

Capacity (kW)	Input AC reactor		Output AC reactor		DC reactor	
	Current (A)	Inductance (mH)	Current (A)	Inductance (mH)	Current (A)	Inductance (mH)
E380-0.7G3BE-00	5	3.8	5	1.5	/	/
E380-1.5G3BE-00	5	3.8	5	1.5	/	/
E380-2.2G3BE-00	7	2.5	7	1	/	/
E380-3.7G3BE-00	10	1.5	10	0.6	/	/
E380-5.5G3BE-00	15	1.0	15	0.25	/	/
E380-7.5G3BE-00	20	0.75	20	0.13	/	/
E380-11G3BE-00	30	0.60	30	0.087	/	/
E380-15G3BE-00	40	0.42	40	0.066	/	/
E380-18.5G3BE-00	50	0.35	50	0.052	40	1.3
E380-22G3BE-00	60	0.28	60	0.045	50	1.08
E380-30G3NE-00	80	0.19	80	0.032	65	0.80
E380-37G3NE-00	90	0.16	90	0.030	78	0.70
E380-30G3BE-00	80	0.19	80	0.032	65	0.80
E380-37G3BE-00	90	0.16	90	0.030	78	0.70

3.5 Typical System Connection

3.5.1 Typical system connection for single-phase 220V

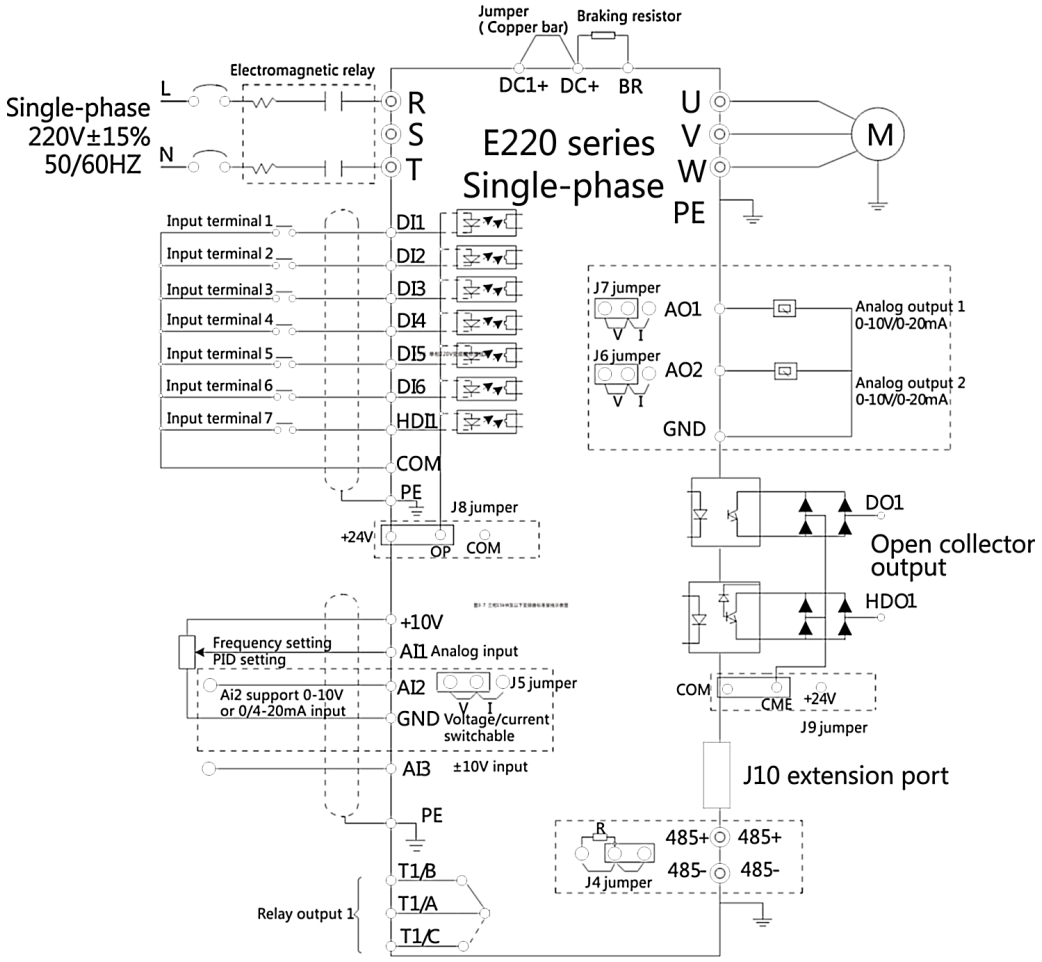
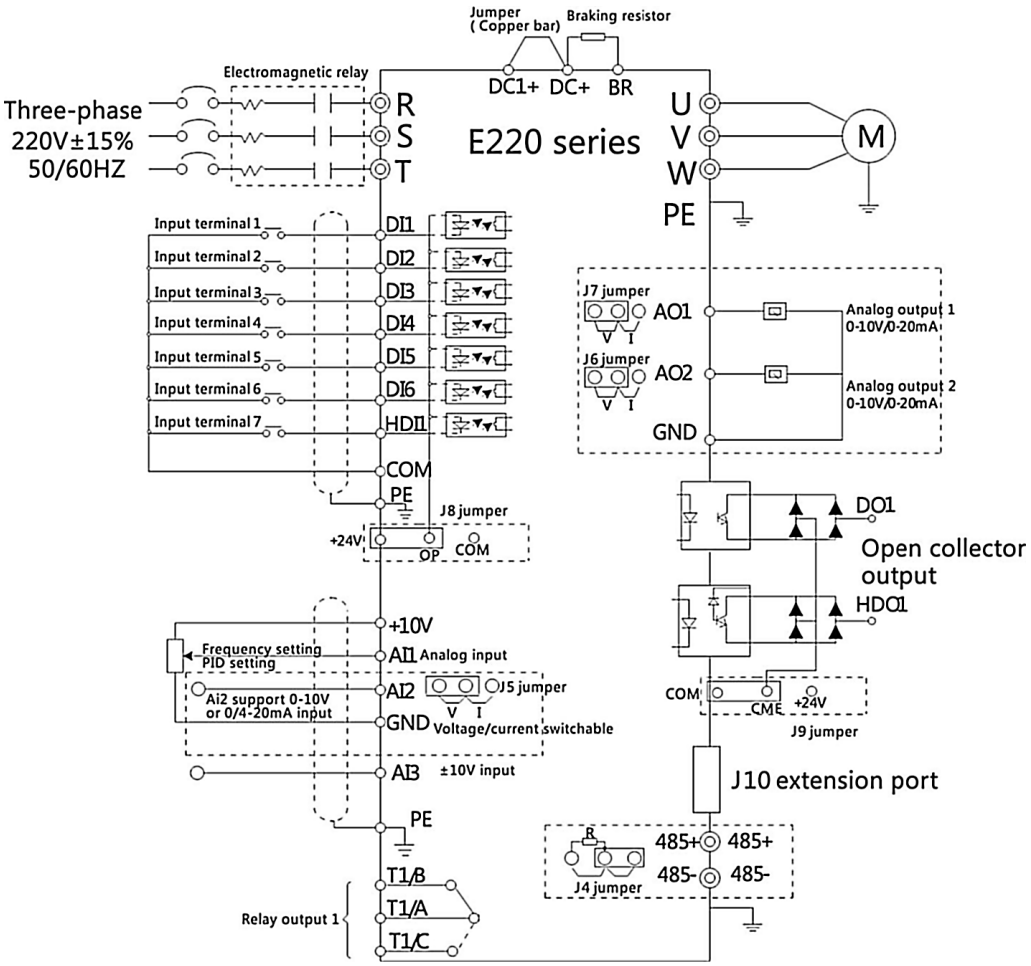


Figure 3-7 Standard connection for models of 3-phase 15kW or less

3.5.2 Typical system connection for three-phase 220V



3.5.3 Typical system connection for three-phase 380V

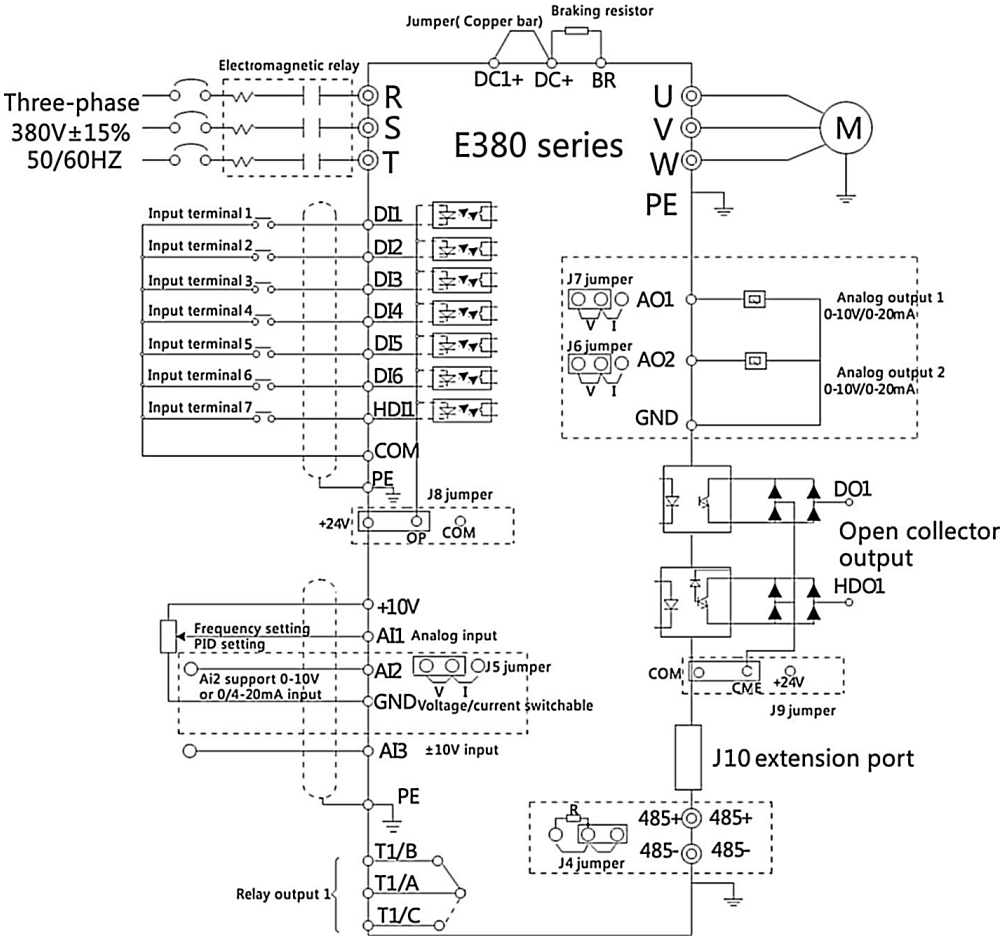


Figure 3-7 Standard connection for models of 3-phase 15kW or less

Notes:

1)◎indicates the main circuit terminal, ○ indicates control circuit terminal;

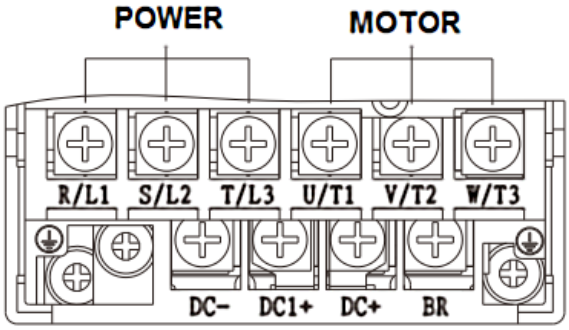
2) The product model name with “B” indicates the standard model is built-in braking unit;

3) The selection of braking resistor is determined by user’s actual needs. Refer to Table 2-4 for the selection of braking unit;

4) The power cables must be laid far away from control cables. If the control cable must run across the power cable, make sure they are arranged at an angle of close to 90°. Shielded twisted pair (STP) cable is recommended for analog signal lines and three-core shielded cable is for power cables.

3.6 Main circuit terminals

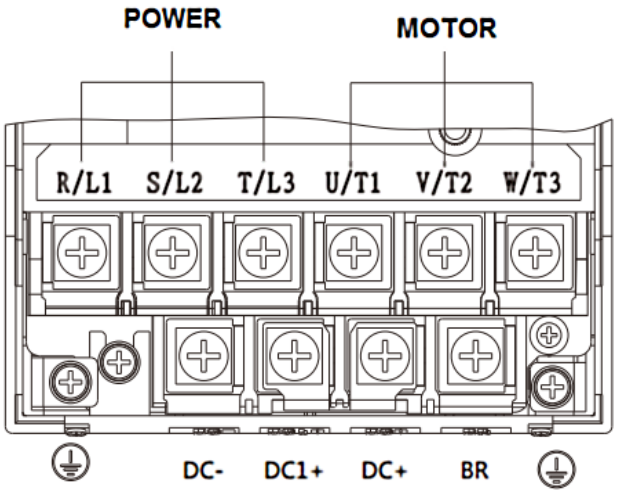
3.6.1 Main circuit wiring for three-phase inverter 380V 1.5kW



Main circuit wiring for 1.5kW

Figure 3-5 Main circuit wiring for three-phase 1.5kW or less

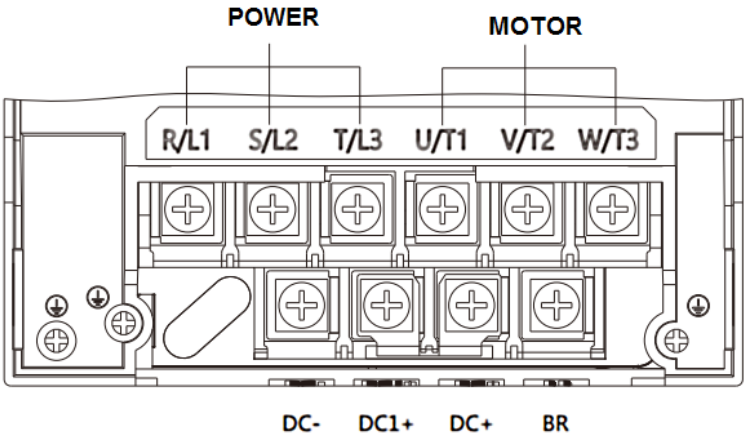
3.6.1.2 Main circuit wiring for three-phase inverter 380V 3.7kW



Main circuit wiring for 3.7kW

Figure 3-6 Main circuit wiring for three-phase 2.2kW~3.7kW

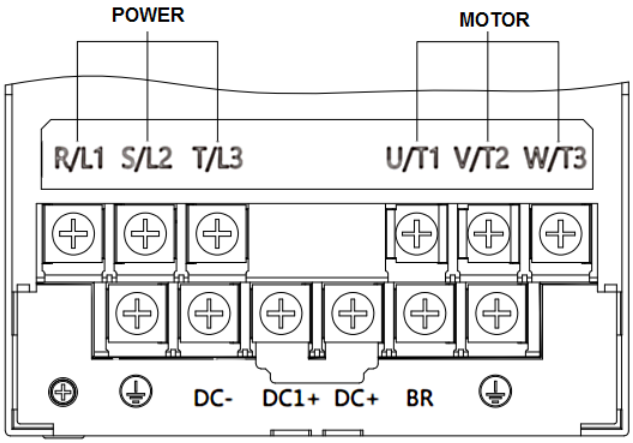
3.6.1.3 Main circuit wiring for three-phase inverter 380V 7.5kW



Main circuit wiring for 7.5kW

Figure 3-7 Main circuit wiring for three-phase7. 5kW or more

3.6.1.4 Main circuit wiring for three-phase inverter 380V 15kW



Main circuit wiring for 15kW

Figure 3-8 Main circuit wiring for three-phase 11kW~15kW

3.6.1.5 Main circuit wiring for three-phase inverter 380V 22kW

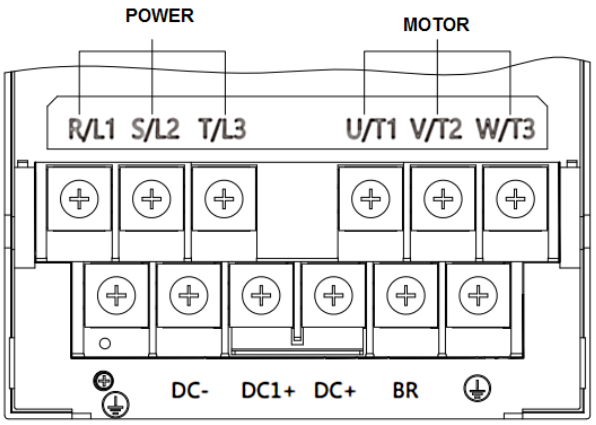
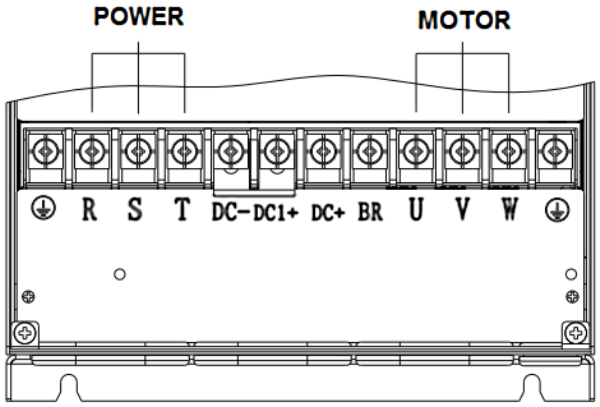


Figure 3-9 Main circuit wiring for three-phase 18. 5kW~22KW

3.6.6 Main circuit wiring for three-phase inverter 380V 37kW



3.6.2 Description of main circuit terminals

Table 3-6 Description of main circuit terminals

Terminal	Description
R\L1、S\L2、T\L3	Three-phase power supply input terminals, connect to three-phase AC power supply
U\T1、V\T2、W\T3	Three-phase power supply output terminals, connect to three-phase AC motor
DC+、DC-	Positive and negative terminals of DC bus, connect to braking unit
DC+、BR	Connect to braking resistor
DC1+、DC+	Connect to DC reactor
⏚	Grounding terminal

⚠DANGER
•There are two voltage classes: 220V and 380V for E-series inverter of three-phase power. Please check whether the power voltage on the nameplate is consistent with the voltage to be connected before power-on. •Terminals (+) and (-) of DC bus have residual voltage after the inverter is switched off. Check if the voltage is less than 36V before contact, failure to comply may cause electric shock. •Pay special attention to the polarity of DC+ and DC- when selecting external braking units. Failure to comply may cause fire or damage to the inverter. •Do not connect the braking resistor to the DC bus, failure to comply may cause fire or damage to the inverter.

⚠WARNING
•Power input terminals L, N or R,S,T: The cable connection on the input side of the inverter has no phase sequence requirement. •The cable length of the braking unit shall be no longer than 10 m. Use twisted pair wire or pair wires for parallel connection. •Braking resistor connecting terminals DC+、BR：The connecting terminals of the braking resistor are effective only for the inverter configured with the built-in braking unit. The cable length of the braking resistor shall be less than 5 m. Otherwise, it may damage the Inverter. •External DC reactor connecting terminals DC1+、DC+：remove the jumper bar across terminals DC1+and DC+ for all the inverters and install the reactor between the two terminals. •Output terminals U, V, W: The capacitor or surge absorber cannot be connected to the output side of the inverter. Otherwise, it may cause frequent inverter fault or even damage the Inverter. •If the motor cable is too long, electrical resonance will be generated due to the impact of distributed capacitance. This will damage the motor insulation or generate higher leakage current, causing the inverter to trip in overcurrent protection. If the motor cable is greater than 100 m long, an AC output reactor must be installed close to the inverter. •Grounding terminals: This terminal must be reliably connected to the main earthing conductor and the grounding resistance should be less than 10Ω. Otherwise, it may cause electric shock, mal-function or even damage to the inverter. •Do not connect the earthing terminal to the neutral conductor of the power supply.

3.7 Control circuit terminals

3.7.1 Terminal arrangement of control circuit

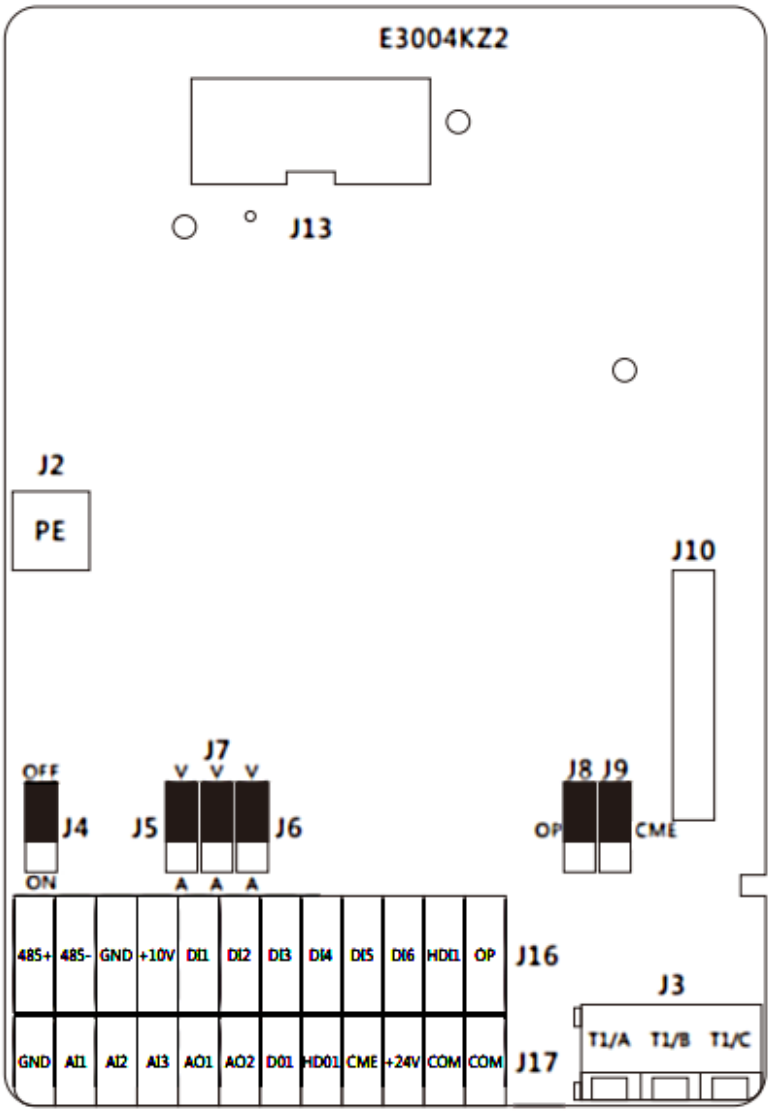


Figure 3-11 Terminal arrangement of control circuit

3.7.2 Description of control circuit terminals

Type	Terminal	Name	Function description
Power supply	+10V-GND	+10V power supply	1. Provide +10 V power supply to external unit. 2. Generally, it provides power supply to external potentiometer with resistance range of 1kΩ~10kΩ; 3. Maximum output current: 10 mA
	+24V-COM	External +24V power supply	1. Provide +24 V power supply to external unit. Generally, it provides power supply to DI/DO terminals and external sensors. 2. Maximum output current: 200 mA
	OP	Input terminal of external power supply	1. Connect to +24 V by default. 2. WhenDI1~DI6, HDI1 need to be driven by external signal, OP needs to be connected to external power supply and be disconnected from the jumper J8.(cannot be connected to +24V or COM)

Communication	485+	RS-485 communication terminal	Standard RS-485 communication terminal, please use shield twisted pair cable.
	485-	RS-485 communication terminal	Standard RS-485 communication terminal, please use shield twisted pair cable.
Analog input	AI1-GND	Analog input terminal 1	1. Input voltage range: 0V~10V DC; 2. Input impedance: 22kΩ
	AI2-GND	Analog input terminal 2	1. Input range: 0–10 VDC/0/4–20 mA, decided by jumper J5 on the control board, Default: 0–10 VDC 2. Impedance: 22 kΩ (voltage input), 500 Ω (current input)
	AI3-GND	Analog input terminal 3	1. Input voltage range: -10V~+10VDC; 2. Input impedance: 22kΩ
Digital input	DI1-COM	Digital input 1	1. Optical coupling isolation, compatible with dual polarity input . Impedance: 3.3kΩ 2. Multifunctional digital input, set the functions by P05.00~P05.05 3. Internal +24V power supply by default, COM is the common terminal 4. When using external power supply, J8 should be disconnected and connect +24V to the OP terminal. COM is the common terminal.(external voltage range: +24V±10%)
	DI2-COM	Digital input 2	
	DI3-COM	Digital input 3	
	DI4-COM	Digital input 4	
	DI5-COM	Digital input 5	
	DI6-COM	Digital input 6	
	HDI1-COM	High-speed pulse input	1. When used as general digital input, the features are same to the DI1~DI6’ s. 2. Connection with OP terminal as the dual-polarity high-speed pulse input terminal, max. input frequency is 100kHz; 3. When using external power supply, the input voltage range is +24V±10%; 4. Impedance : 1.65kΩ
Analog output	AO1-GND	Analog output terminal 1	Support 0V~10V voltage or 0/4mA~20mA current output, Voltage or current output is decided by jumper J7. Default: 0V~10V voltage output
	AO2-GND	Analog output terminal 2	Support 0V~10V voltage or 0/4mA~20mA current output, Voltage or current output is decided by jumper J6. Default: 0V~10V voltage output
Digital output	DO1-COM	Digital output 1	1. Optical coupling isolation, dual polarity open collector output 2. Voltage range: 5V~24V(resistance range: 0.48 kΩ~10 kΩ) 3. Output current range: 0mA~50mA
	HDO1-COM	Highs-speed pulse output terminal	1. When used as digital output, the feature is same to the DO1. 2. Connection with OP terminal as the dual-polarity high-speed pulse output terminal, max. input frequency is 100kHz; 3. Voltage range: 5V~24V(resistance range: 0.48 kΩ~10 kΩ) 4. Output current range: 0mA~50mA
Relay	T1/A-T1/B	NC terminal	Contact driving capacity: 250V AC，3A，COSΦ=0.4； 30V DC，1A
	T1/A-T1/C	NO terminal	

3.7.3 Jumper description

Jumper symbol	Selection	Function description
J7	A mark	When connected here, 0/4mA~20mA DC current output is selected for AO1 terminal.

	V mark	When connected here, 0V~10V DC voltage output is selected for AO1 terminal.
J6	A mark	When connected here, 0/4mA~20mA DC current output is selected for AO2 terminal.
	V mark	When connected here, 0V~10V DC voltage output is selected for AO2 terminal.
J5	A mark	When connected here, 0/4mA~20mA DC current output is selected for AI2 terminal.
	V mark	When connected here, 0V~10V DC voltage output is selected for AI2 terminal.
J8	24V	When inserted here, OP terminal should be connected to +24V. At this time, HDI 1, DI 1~DI 6 become valid when connected with COM for input.
	COM	When inserted here, OP terminal should be connected to COM. At this time, HDI 1, DI 1~DI 6 become valid when connected with +24V for input.

3.7.4 Interfaces description

Symbols	Name	Function description
J10	Control board-extension card	This interface is used for the connection of control board and extension card. This is the electrical channel that control board supplies power to the extension card and for signal connection.
J13	Control board-LED keyboard	This interface is used for the connection of control board and LED keyboard. This is the electrical channel that control board supplies power to the LED keyboard and for signal connection.
J13	Control board-LCD keyboard	This interface is used for the connection of control board and LCD keyboard. This is the electrical channel that control board supplies power to the LCD keyboard and for signal connection.

3.7.5 Wiring of inverter control circuit

3.7.5.1 Digital input terminal

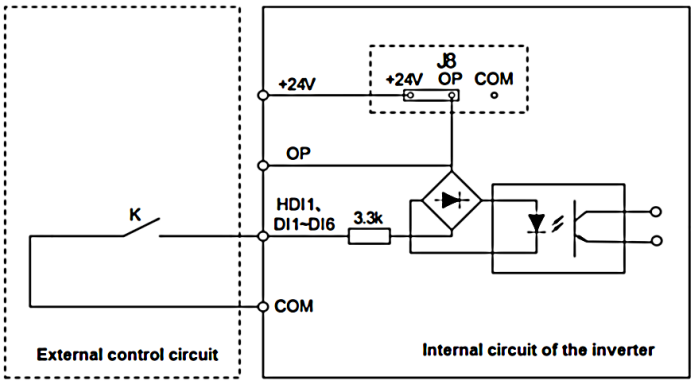


Figure 3-12 Internal circuit wiring of inverter(digital input terminal)

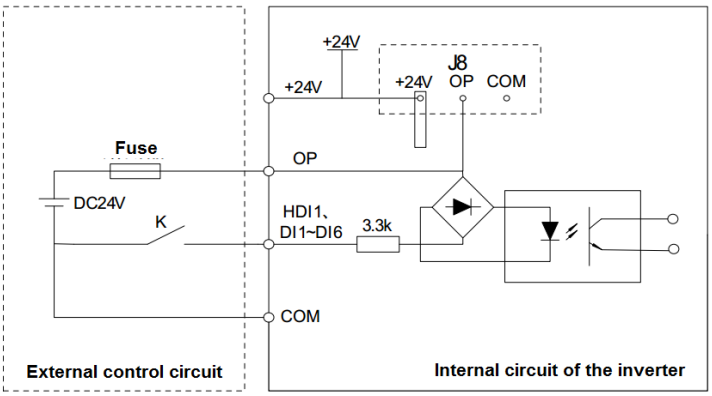


Figure 3-13 External circuit wiring of inverter(digital input terminal)

Refer to Figure 3-13 for the wiring when using external power supply(The power must be in consistent with UL CL ASS 2 standards and connect the fuse of 4A between the power supply and interfaces)

Notes: In such wiring mode, remove the jumperJ8 between +24 V and OP.

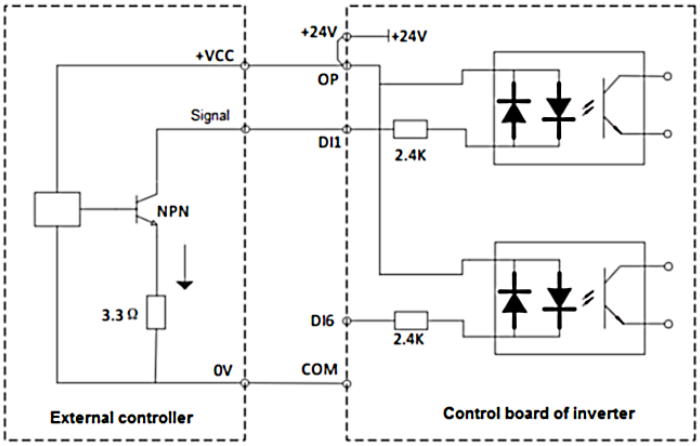


Figure 3-13 SINK wiring

This is the most commonly used wiring mode. To apply external power supply, remove jumpers between +24 V and OP, connect the positive pole of 24V to OP and connect external power supply 0V to corresponding DI terminal via contacts of controller.

Note: In such wiring mode, the DI terminals of different inverters cannot be connected in parallel. Otherwise, DI malfunction may result. If parallel connection (different inverters) is required, connect a diode in series(positive pole) at the DI and the diode needs to satisfy the requirement: IF > 10 mA, UF < 1 V, as shown below.

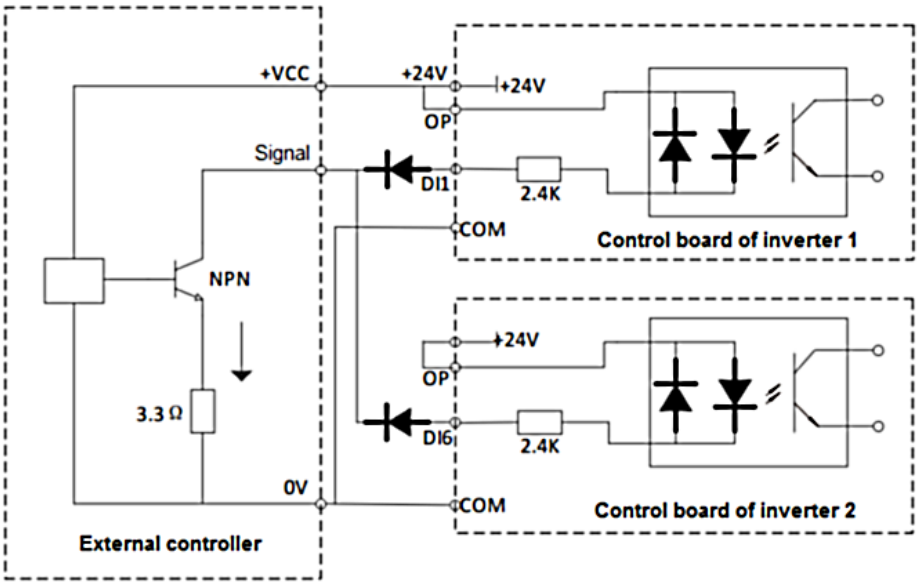


Figure 3-15 DI terminals connected in parallel in SINK mode

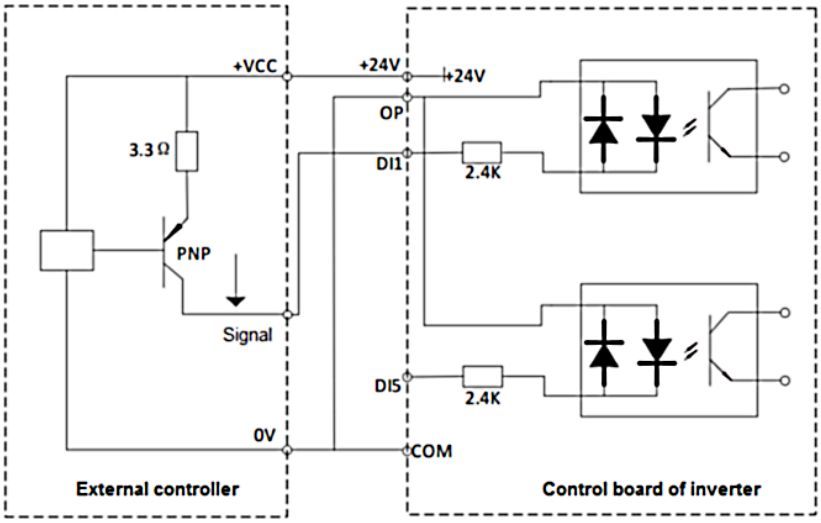


Figure 3-16 SOURCE wiring

In such wiring mode, remove the jumper between +24 V and OP. Connect +24 V to the common port of external controller and meanwhile connect OP to COM. If external power supply is applied, remove the jumper between +24V and OP, connect the 0V of external power supply to OP and connect positive pole of external power supply 24V to corresponding DI terminal via contacts of controller.

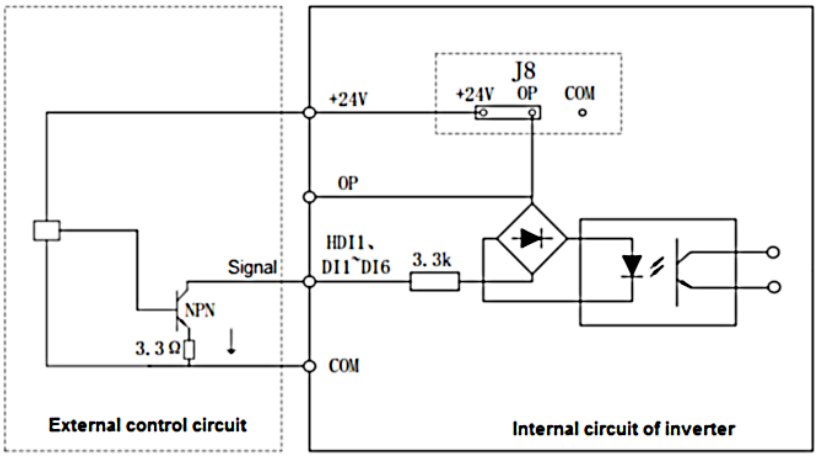


Figure 3-17 Internal power supply wiring of inverter in SINK mode

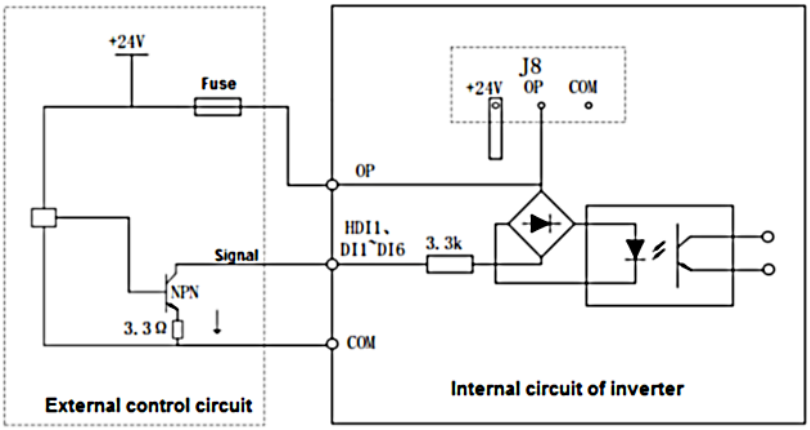


Figure 3-18 External power supply wiring in SINK mode

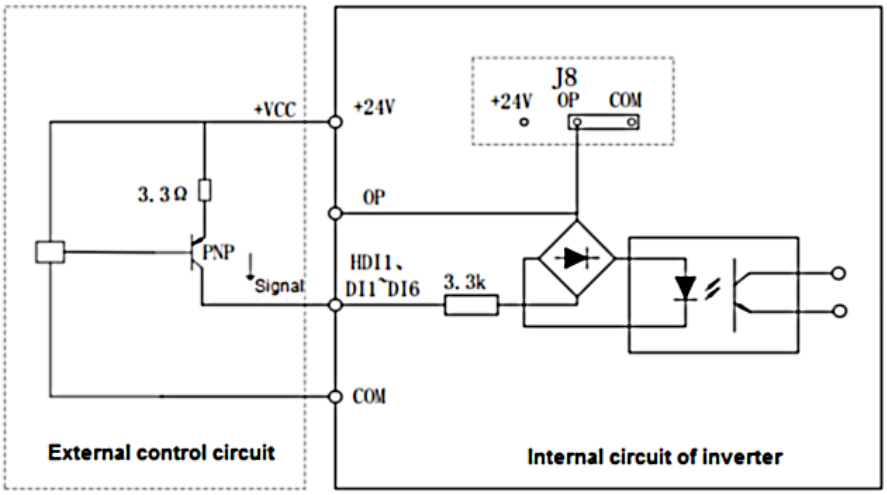


Figure 3-19 Internal power supply wiring of inverter in SOURCE mode

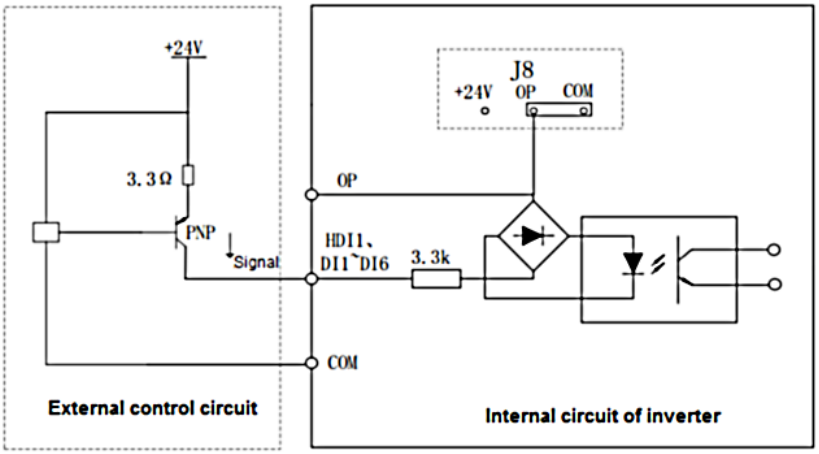


Figure 3-20 External power supply wiring in SOURCE mode

3.7.5.2 Analog input terminal

Weak analog voltage signals are easy to suffer external interference, and therefore the shielded cable must be used and the cable length must be less than 20 m, as shown in following figure.3-20 and 3-21. In applications where the analog signal suffers severe interference, install filter capacitor or ferrite magnetic core at the analog signal source, as shown in Figure 3-22.

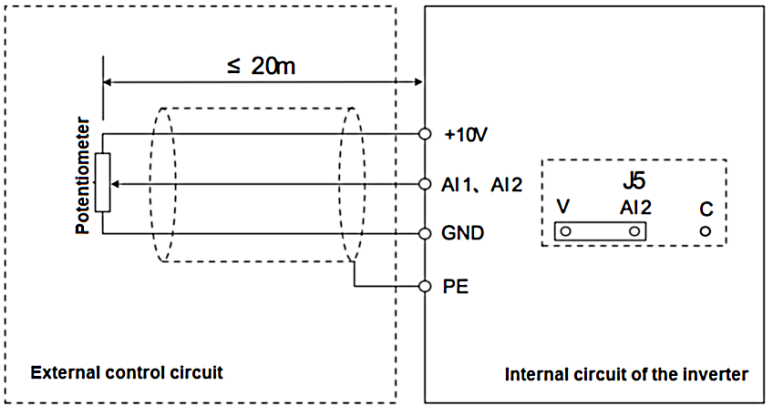


Figure 3-21 Wiring mode of analog input terminals(voltage input)

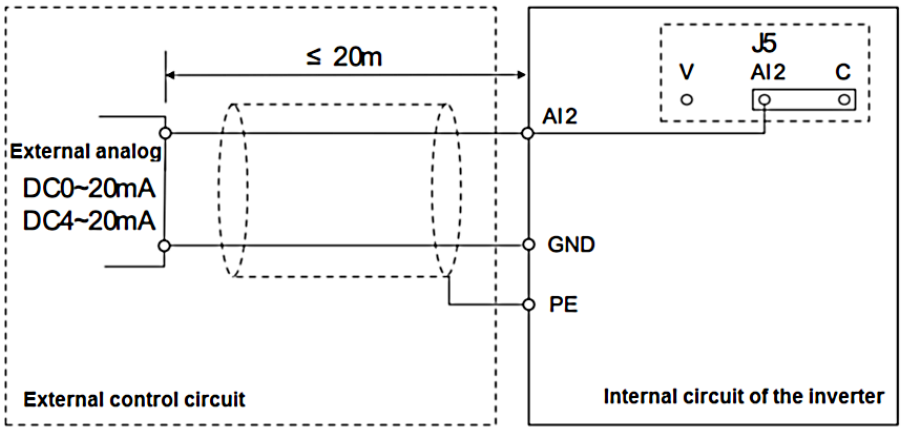


Figure 3-22 Wiring mode of analog input terminals(current input)

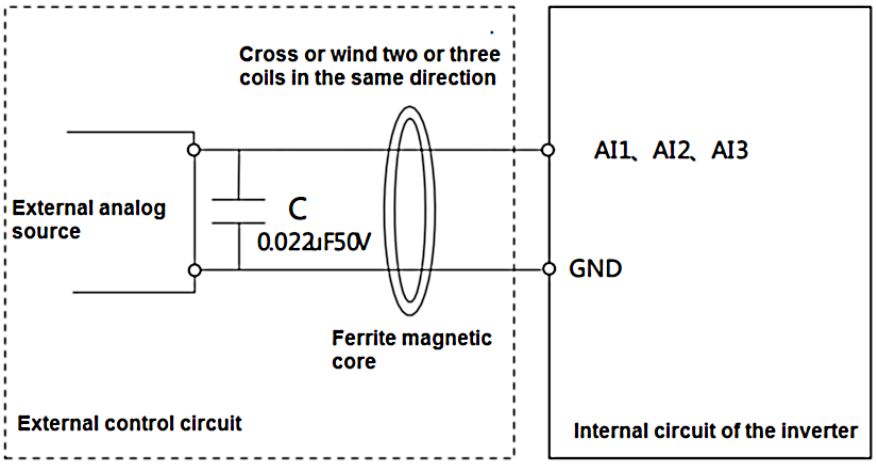


Figure 3-23 Wiring mode of analog input terminals of ferrite magnetic core

3.7.5.3 Digital output terminal

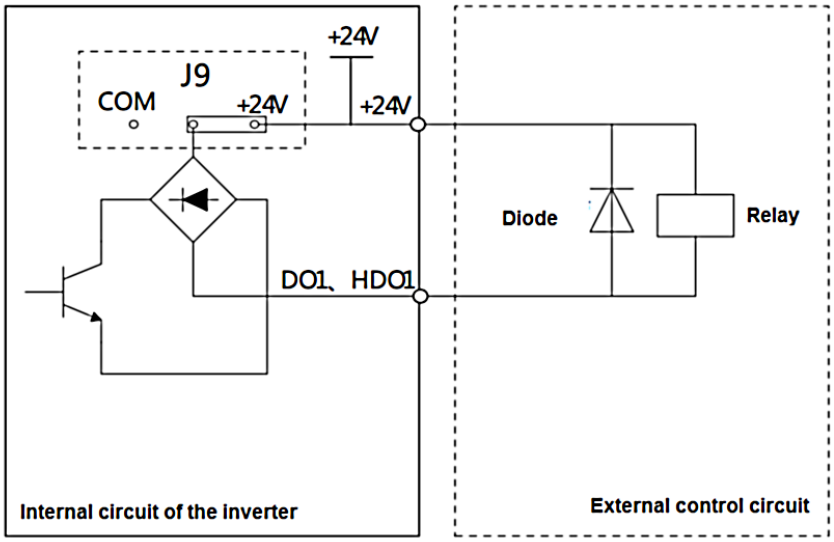


Figure 3-24 Digital output terminal wiring when using internal power

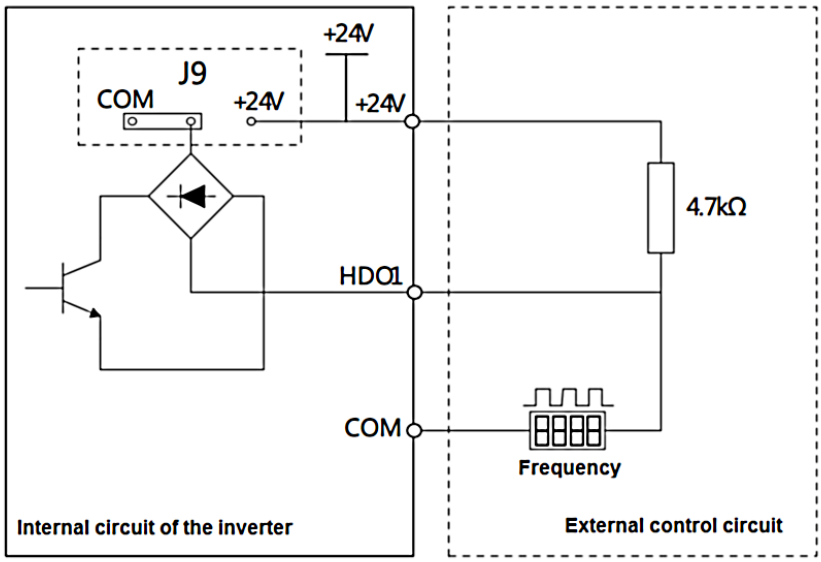


Figure 3-25 Digital output terminal wiring when using external power

When HDO1 is used as digital output terminal is Figure 3-23 and 3-24 (set P06.00 to 0), the function and wiring is same as DO1.

3.7.5.4 High-speed pulse output terminal

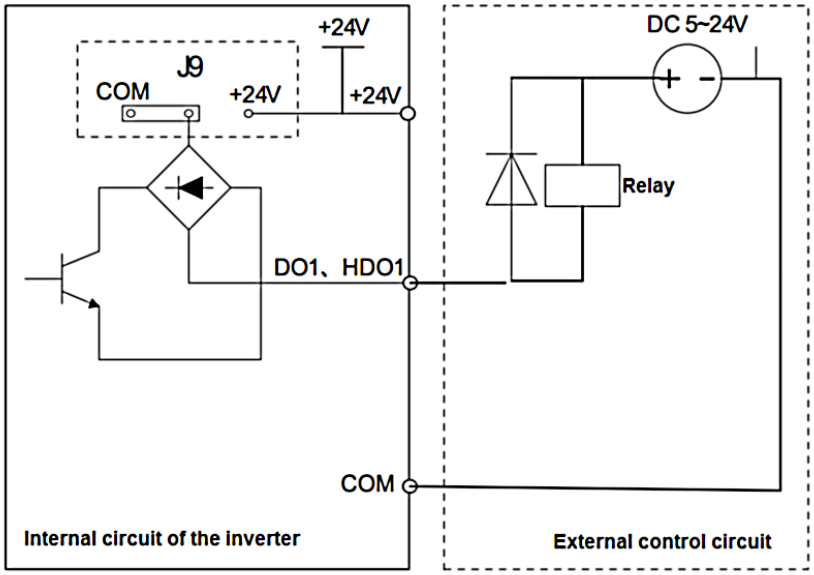


Figure 3-26 High-speed pulse output terminal wiring when using external power

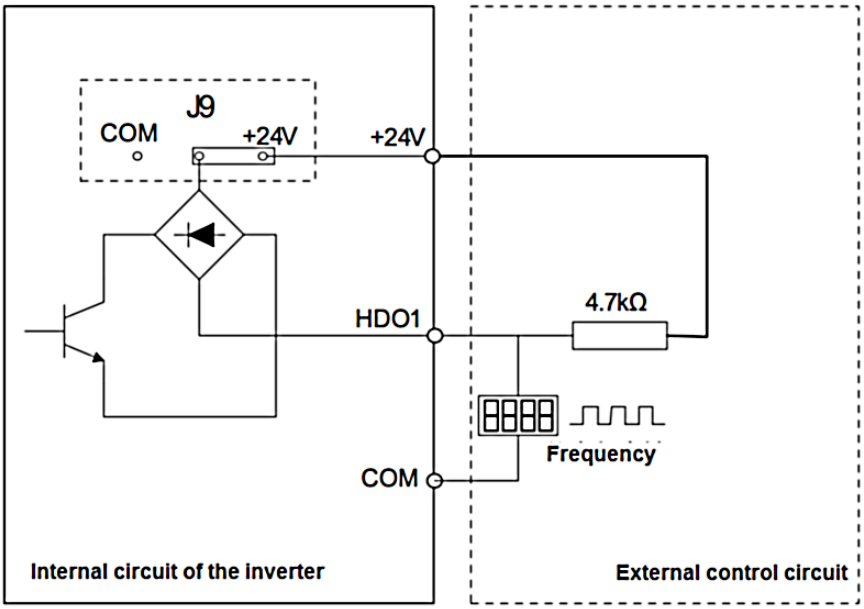


Figure 3-27 High-speed pulse output terminal wiring when using internal power

HDO1 is used as the high-speed pulse output terminal in Figure 3-25 and 3-26. (set P06. 00 to 1)

3.7.5.5 Analog output terminal

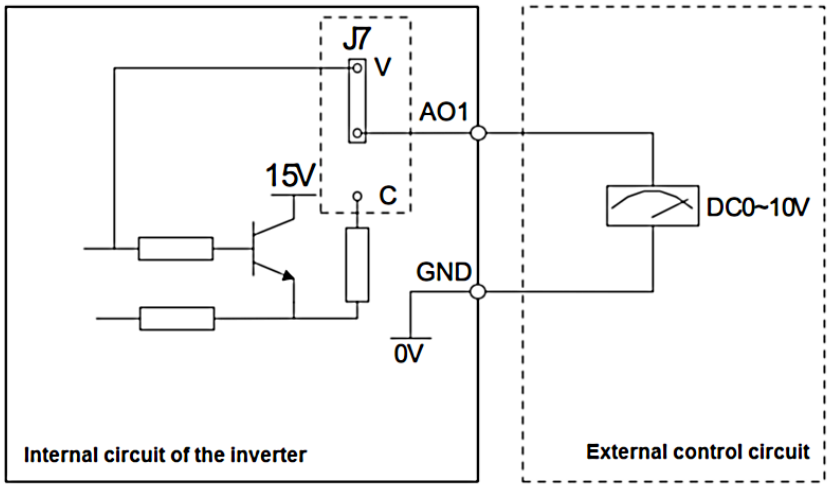


Figure 3-28 Wiring mode of analog output terminal (voltage output)

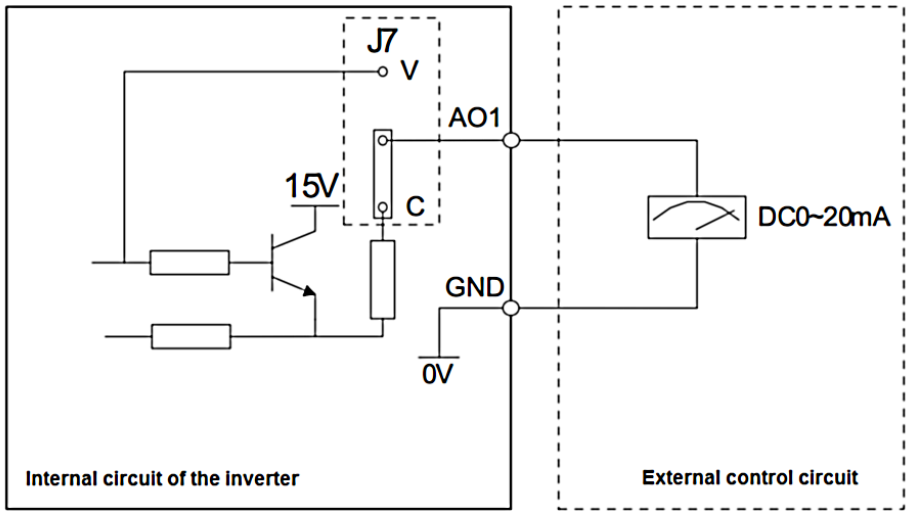
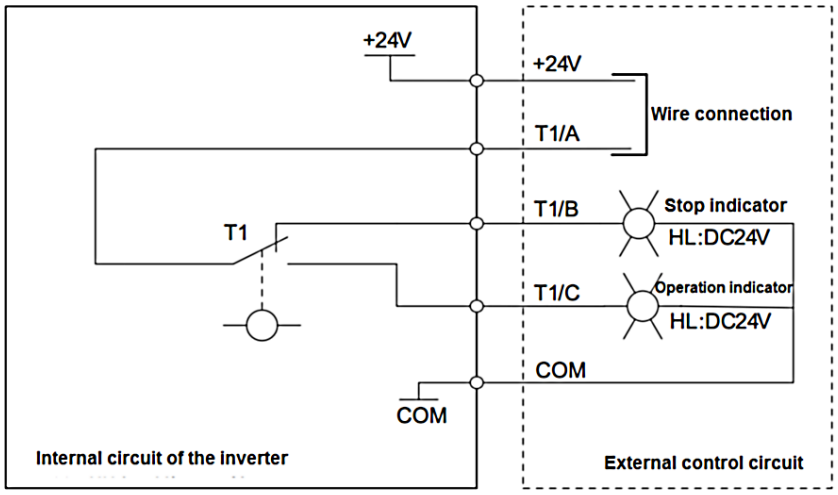
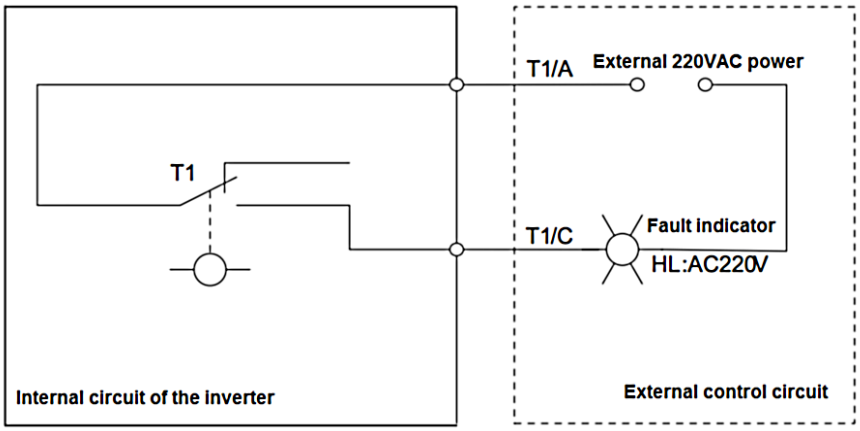


Figure 3-29 Wiring mode of analog output terminal (current output)

3.7.5.6 Relay output terminal



A. Using internal 24VDC power supply



B. Using external 220VAC power supply

Figure 3-30 Relay output terminal wiring

Chapter 4 Operation and display

4.1 Operation panel

You can modify the parameters, monitor the working status and start or stop the inverter by operating the operation panel, as shown in the following figure:

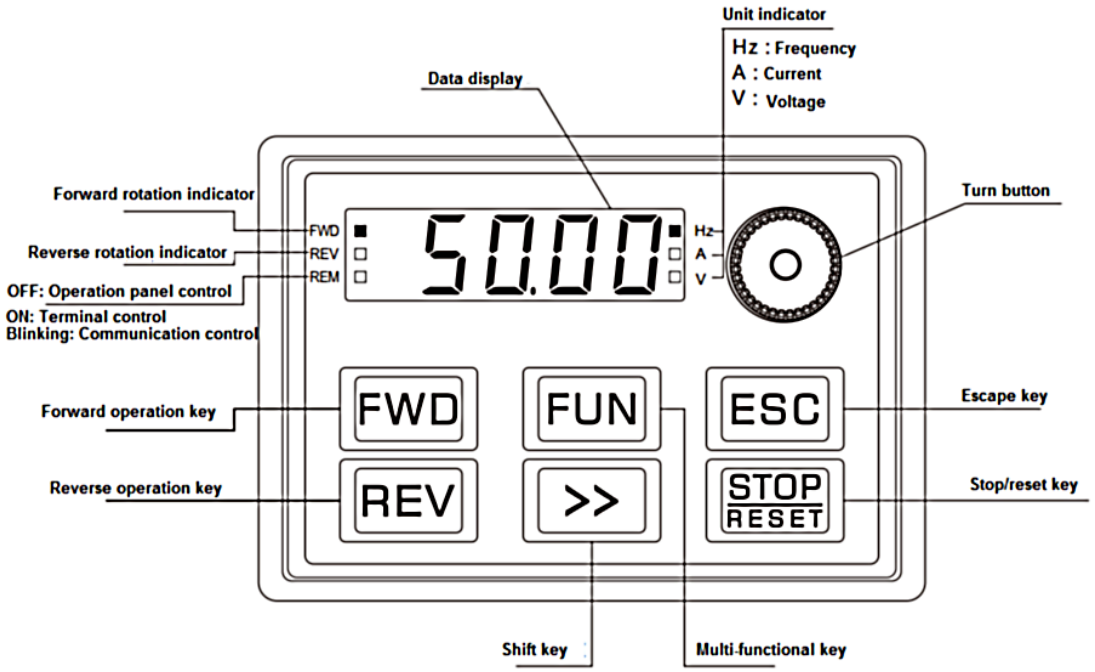


Figure 4-1 Diagram of the operation panel

4.1.1 Description of keys on the operation panel

The function description of six keys and one turn button on the operation panel is shown in Table 4-1.

Table 4-1 Description of keys and button on the operation panel

Symbols	Name	Function description
ESC	Edit/ESC key	Enter or exit the programming status
FWD	Forward operation key	Start the forward operation with the operation panel
REV	Reverse operation key	Start the reverse operation with the operation panel
>>	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
STOP RESET	Stop/Reset	Stop the inverter when it is in the running state and perform the reset operation when it is in the fault state. The functions of this key are restricted in P10. 00.
FUN	JOG control/ forward/reverse rotation switchover	Refer to Table 4-2 for details of multi-functional keys.
	Turn button	Increase/decrease the data of setting operation frequency and parameters. Turn left to decrease the parameter data and right to increase the parameter data. And press the button to save the setting parameters.

Table 4-2 Description of FUN(multi-functional) keys

Setting value for P10-02	FUN keys	Description
0	No function	FUN key disabled
1	Forward JOG	Forward JOG function
2	Reverse JOG	Reverse JOG function
3	Emergency stop	Press FUN key to decelerate to stop by the set time of P01-13
4	Coast stop	Coast to stop and output prohibit
5	Operation command switchover	Operation panel control →Terminal control→Communication control→ Operation panel control, long-press for 2s to switch
6	Clear frequency UP/DOWN	Clear the frequency value adjusted by UP/DOWN

4.1.2 Description of indicators

Six indicators on operation panel and its description are shown as Table 4-3.

Table 4-3 Description of indicators

Indicators		Name	Description
State indicators	FWD	Forward rotation indication	ON: In the stop state, the forward rotation command has been performed In the running state, the inverter operates normally Flash: Switching from forward rotation to reverse rotation
	REV	Reverse rotation indication	ON: In the stop state, the reverse rotation command has been performed In the running state, the inverter operates normally Flash: Switching from reverse rotation to forward rotation
	REM	Operation command setting	OFF: Operation panel control ON: Terminal control Flash: Communication control
Unit indicators	Hz	Frequency indication	ON: Show the unit of frequency
	A	Current indication	ON: Show the unit of current
	V	Voltage indication	ON: Show the unit of voltage
	Hz + A	Speed indication	ON: Show the unit of speed
	Hz + V	Percentage indication	ON: Show the unit of percentage
	Hz + A + V	Time indication	ON: Show the unit “s”
	All OFF	No unit	No unit

4.1.3 Viewing and modifying Function Codes

The operation panel of the inverter adopts three-level menu to set the parameters.

The three-level menu consists of function parameter group (Level I), function code (Level II), and function code setting value (level III), as shown in the following figure.

Figure 4-2 Operation procedure on the operation panel

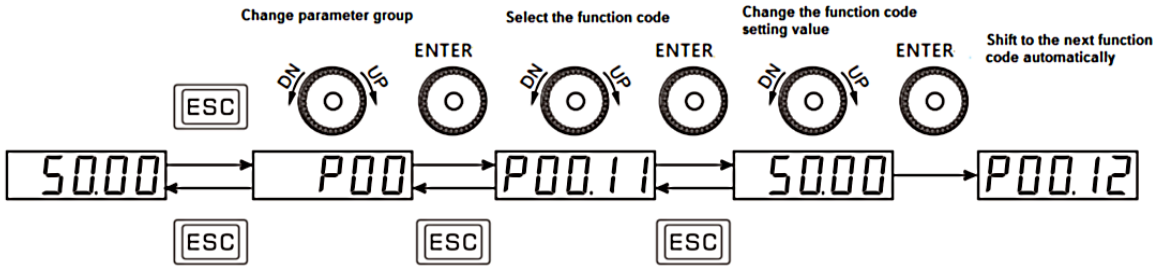


Figure 4-2 Operation procedure of Level III menu

You can return to Level II menu from Level III menu by pressing ESC and ○:

When pressing ○, the system saves the parameter setting first, and then goes back to Level II menu and shifts to the next function code.

When pressing ESC, the system does not save the parameter setting, but directly returns to Level II menu and remains at the current function code.

In Level III menu, the setting value can be increased/decreased by the Turn button ○ only when the digit flashes. If two or more digits to be modified, press >> button to the digit to be modified until flashes. if the parameter has no blinking digit, it means that the parameter cannot be modified. This may be because:

1) Such a function code is only readable, such as the actually detected parameter and running record parameter. These parameters are always ON no matter in the running state or stop state.

2) Such a function code cannot be modified in the running state and can only be changed at stop. These parameters are always ON in the running state and flash in the stop state.

4.1.4 Status display

The status display on the operation penal has Stop parameter display, RUN parameter display, parameter editing display of function code, fault status display, etc.

1. Stop parameter display

When the inverter is in stop state, the data display area of operation panel show the Stop parameter, the three unit indicator on the right side indicates the unit of the parameter, the three status indicator on the left side indicates the current status of inverter. For example, when the inverter receives the operation direction signal of ‘Reverse” in the stop state, the REV indicator lights. Select the Check menu(recommended to be named as Customized or User setting), to only show the function code number of the parameter whose set value not the same as the default value.

Press >> to display different Stop parameters in turn(set by the function code P10. 04)

2. RUN parameter display

The inverter comes into the RUN state after receiving valid operation commands and the operation panel shows the operation parameters. The on/off of FWD/ REV on the operation panel is decided by the current operation direction. Unit indicator displays the unit of the current parameter.

Press >> to display different operation parameters in turn(set by the function code P10. 03)

3. Fault status display

When the inverter detects fault signal, it comes to the fault status display and flashes to display the error code.

Press >> to display the Stop parameter and error code. Perform the reset operation by STOP RESET button, control terminal or communication commands on the operation panel. If the fault still exists, it continues to display the error codes.

4. Editing display of function code

In the stop, run or fault state, press ESC to come into the editing status(enter the password if user password is set before). For details, refer to P10.00). Two-level menu is displayed in the editing status: function code group or function

code number→function code parameter. Press to come into the function parameter display status. In the function parameter display status, press to perform the save operation and show the next parameter; Press ESC to exit and return to the original parameter.

4.2 Operation and display of optional LCD operation panel

The appearance and function area are shown below:

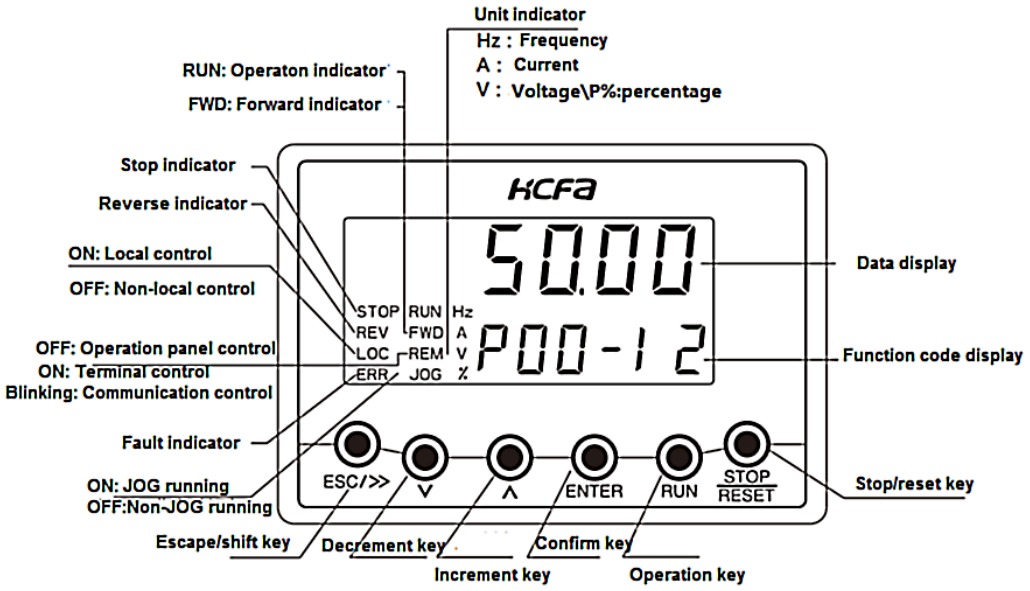


Figure 4-3 Operation panel

4.2.1 Description of keys on the operation panel

Six keys on the operation panel and the description for each key are shown in Table 4-4:

Table 4-4 Description of keys on the operation panel

Symbols	Name	Function description
ESC/>>	Escape/shift	1. Perform the Exit function in level- I and level- II menu 2. Perform the Shift function in level-III menu and main menu.
RUN	Operation	1. Start the inverter in the operation panel control mode
ENTER	Confirm	1. Enter the menu interfaces level by level 2. Confirm the parameter setting.
STOP RESET	Stop/reset	1. Stop the inverter 2. Reset the fault
^	Increment	1. Increase the function code 2. Increase the selected parameter value 3. Increase the frequency
v	Decrement	1. Decrease the function code 2. Decrease the selected parameter value 3. Decrease the frequency

4.2.2 Description of Indicators

Nine indicators on the operation panel and the description for each indicator are shown in Table 4-5:

Table 4-5 Description of Indicators

Indicators		Name	Description
State indicators	FWD	Forward rotation indication	ON: In the stop state, the forward rotation command has been performed In the running state, the inverter operates normally Flash: Switching from forward rotation to reverse rotation
	REV	Reverse rotation indication	ON: In the stop state, the reverse rotation command has been performed In the running state, the inverter operates normally Flash: Switching from reverse rotation to forward rotation
	REM	Operation command setting	OFF: Operation panel control ON: Terminal control Flash: Communication control
	STOP	Stop state	OFF: In the running state ON: In the stop state
	RUN	Operation state	OFF: In the stop state ON: In the running state
	ERR	Error display	OFF: No error ON: Error display
	JOG	JOG operation	OFF: Non-Jog operation ON: JOG operation
	LOC	Local control command	OFF: Non-local control(terminal or communication control) ON: Local control
Unit indicators	Hz	Frequency indication	ON: Show the unit of frequency
	A	Current indication	ON: Show the unit of current
	V	Voltage indication	ON: Show the unit of voltage
	Hz + A	Speed indication	ON: Show the unit of speed
	%	Percentage indication	ON: Show the unit of percentage
	Hz + A + V	Time indication	ON: Show the unit “s”
	All OFF	No unit	No unit

4.2.3 Viewing and modifying function codes

The operation panel of the inverter adopts three-level menu to set the parameters.

The three-level menu consists of function parameter group (Level I), function code (Level II), and function code setting value (level III), as shown in the following figure.

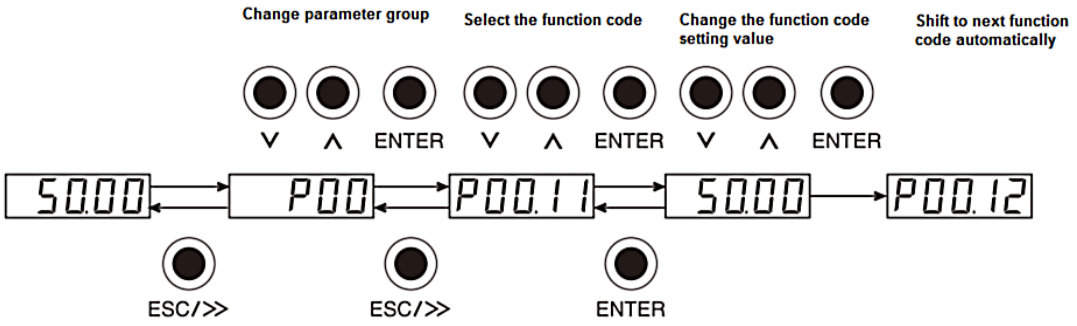


Figure 4-4 Operation procedure of Level III menu

Notes:

Difference compared to the standard operation panel:

1. ESC key: Press this key in level-III menu on standard operation panel, exit the function code parameter setting and enter into level- II and this change is invalid; On the optional operation panel, press this key to shift to the selected digit in level-III. If you want to exit the level-III menu, press ENTER key to confirm this change and exit. In other words, this change must be valid, otherwise, you cannot exit level-III menu.

2. ESC key: Press this key in main menu(operation or stop display) on standard operation panel, enter into the level- I menu; On the optional operation panel, press this key to switch the parameters of operation and stop state.

3. There’ s no shift function in level- I and level- II .

4. On standard operation panel, turn the “Turn button” to the right to increase the function code group, function code or function code setting value; But on optional operation panel, this can be realized by press Increment key;

5. On standard operation panel, turn the “Turn button” to the left to decrease the function code group, function code or function code setting value; But on optional operation panel, this can be realized by press Decrement key;

4.3 Setting and auto-tuning of motor parameters

When selecting vector control mode, input the motor nameplate parameters correctly before operation and E-series inverter will match to the motor by the nameplate parameters; Accurate motor parameters are required to ensure desired driver performance and running efficiency in the vector control mode.

Procedures and precautions for setting and auto-tuning of motor parameters are as follows:

1) First, set Command source selection P00. 02 to 0 Operation panel control. If dynamic auto-tuning is required, disconnect the load from motor.

2) Input the motor nameplate parameters correctly, such as rated motor power, rated voltage, rated current, rated frequency and rated rotational speed and the corresponding function codes are P02. 01~P02. 05. If motor 2 is selected, the corresponding function code is P20. 01~P20. 05.

3) Set the function code P00.33 to have the auto-tuning selection, press ⊙ button and “T UN- 0” will be displayed in the data display area. Press FWD or REV key to start motor parameters auto-tuning and “TUN-2” or “TUN-1” will be displayed in the data display area. When “TUN-2” or “TUN-1” disappear, the motor parameters auto-tuning completed.

4) After motor auto-tuning, check P02. 10 parameter value. Generally this value should be less than 60% of rated current P02. 03. If not, auto-tuning is required again and check if the motor is disconnected from the load for dynamic auto-tuning.

5) Use the default parameters and just input the motor power (motor 1: P02. 01 and motor 2: P20. 01) when cannot get

the motor nameplate parameters and no need for motor auto-tuning.

6) When restoring the motor auto-tuning parameters to the factory default values, modify the rated motor power (motor 1: P02. 01 and motor 2: P20. 01) to the required power, the auto-tuning parameters will be restored to the factory default value automatically.

7) Press STOP RESET to stop the auto-tuning in the auto-tuning process. Notes: The start and stop of auto-tuning is controlled by operation panel; After auto-tuning, the function code will return to 0 automatically.

4.4 Password setting:

E-series inverter provide the user password protection function. When P10. 00 is set to a nonzero value, the value is the user password. The password takes effect after you after exit the function code editing state. When you press ESC again, "------" will be displayed, and press ⊙ or turn the "Turn button" to the left to display "00000". User must enter the correct user password to view or set parameters.

4.5 Parameter lock

E-series inverter provide user parameter lock function. When set P00. 31 to 1, the parameter lock becomes valid; When set P00. 31 to 2, the initialization of parameters is not allowed. When without user password, the parameter lock can be set to protect the user parameters effectively or prevent user from initializing parameter by mistake.

Chapter 5 Function code list

The symbols in the function code list described as follows:

○——The setting value can be modified in the running state;

◎——The setting value cannot be modified in the running state;

●——The parameters are the monitoring parameters and reserved parameters and cannot be modified.

Function code	Name	Setting range	Default	Property	Communication address
P00 Standard function parameters group					
P00. 00	Motor operation mode	0：V/F control 1：Sensorless vector control(SVC)	0	◎	0x0000
P00. 01	Reserved			●	
P00. 02	Command source selection	0: Operation panel control (L/R off) 1: Terminal control (L/R on) 2: Communication control (L/R blinking)	0	◎	0x0002
P00. 03	Frequency source A	0：Digital setting(P00. 12)+Up/Down 1：Digital setting (P00. 12) 2：AI 1 3：AI 2	0	◎	0x0003

		4：AI 3 5：PULSE-I N Pulse setting 6：Simple PLC 7：Multi-reference 8：MODBUS communication 9：PID Notes: AI1，AI2，AI3 input full scale 100% and item 5 to 9 setting 100% corresponds to P00. 08 max. output frequency. When ten’ s digit of P00. 28 is set to 1, the frequency source can be adjust by UP/DOWN.			
P00. 04	Frequency source B	0：Digital setting (P00. 12) 1：AI 1 2：AI 2 3：AI 3 4：PULSE-I N Pulse setting 5：Simple PLC 6：Multi-reference 7：MODBUS communication setting 8：PI D Notes: AI1，AI2，AI3 input full scale 100% and item 1 to 8 setting 100% corresponds to P00. 08 max. output frequency.	0	◎	0x0004
P00. 05	Frequency command operation relationship	0： Frequency source A 1： Frequency source B 2：Frequency source A+B 3： Frequency source A -B 4： MAX(A, B) 5： MI N(A, B) 6： Switchover of frequency source A/B 7： A/A+B 8： A/A-B 9： A/MAX(A, B) 10：A/MI N(A, B) 11：Non-zero number for A, B frequency source, A comes first	0	○	0x0005
P00. 06	Range base of frequency source B	0：Relative to maximum frequency 1：Relative to frequency source A	0	○	0x0006
P00. 07	Range of frequency source B	0%~150%	100%	○	0x0007
P00. 08	Max. output frequency	0. 00Hz~500. 00Hz	50. 00Hz	◎	0x0008
P00. 09	Frequency upper limit source	0：Frequency upper limit digital setting(P00. 10) 1：AI 1 2：AI 2	0	◎	0x0009

		3：AI 3 4：PULSE-I N pulse setting 5：MODBUS communication setting Notes：100% corresponds to max. output frequency P00. 08 for 1 ~5 full scale.			
P00. 10	Frequency upper limit digital setting	P00. 11~P00. 08	50. 00Hz	○	0x000A
P00. 11	Frequency lower limit	0. 00Hz~P00. 10	0. 00Hz	○	0x000B
P00. 12	Setting frequency	0. 00Hz~P00. 08	50. 00Hz	○	0x000C
P00. 13	Acceleration time 0	0s~65000s	Model dependent	○	0x000D
P00. 14	Deceleration time 0	0s~65000s	Model dependent	○	0x000E
P00. 15	Acceleration time 1	0s~65000s	Model dependent	○	0x000F
P00. 16	Deceleration time 1	0s~65000s	Model dependent	○	0x0010
P00. 17	Acceleration time 2	0s~65000s	Model dependent	○	0x0011
P00. 18	Deceleration time 2	0s~65000s	Model dependent	○	0x0012
P00. 19	Acceleration time 3	0s~65000s	Model dependent	○	0x0013
P00. 20	Deceleration time 3	0s~65000s	Model dependent	○	0x0014
P00. 21	Acceleration/deceleration time unit	0：0. 01s 1：0. 1s 2：1s	0	○	0x0015
P00. 22	Acceleration/deceleration time Base frequency	0：Max. output frequency P00.08 1：Setting frequency （The time required from 0 to the setting frequency by acceleration/deceleration is same as acceleration/ deceleration time)	0	◎	0x0016
P00. 23	Parameter initialization	0： No operation 1：Restore to factory default（no motor parameters） 2： Error clearing record 3： Accumulated operation/power-on time clearing 4：Restore to factory default（with motor parameters）	0	◎	0x0017
P00. 24	Motor 1 Rotation direction selection	0： Same direction 1： Reverse direction 2： Reverse direction prohibition	0	○	0x0018
P00. 25	Carrier frequency setting	1. 0kHz~16. 0kHz	Model dependent	○	0x0019

P00. 26	Carrier frequency adjustment	Unit’s digit: Carrier frequency adjustment with temperature 0： Automatic adjustment 1： No adjustment Ten’s digit：Carrier frequency adjustment with output frequency 0：Automatic adjustment 1：No adjustment Hundred’s digit：Reserved Thousand’s ：Reserved	0x0000	◎	0x001A
P00. 27	PWM method	0：Switchover of Five-segment and seven-segment 1：Five-segment 2: Seven-segment	0	◎	0x001B
P00. 28	Operation panel and terminal UP/DOWN Frequency control	Unit’s digit: ： Retentive function 0：Retentive at power failure 1：Non-retentive at power failure Ten’s digit: Adjustment setting（Only for frequency source A） 0：Valid only when frequency source A P00. 03=0 1：All setting of frequency source A is valid 2：Setting prohibition Hundred’s digit：Integral function 0：With integral function 1：No integral function Thousand’s digit：Reverse direction change 0：Frequency reverse direction change prohibition 1：Frequency reverse direction change allowed	0x0000	◎	0x001C
P00. 29	Length of operation panel and terminal UP/DOWN per step	0. 01HZ~5. 00Hz	0. 01Hz	○	0x001D
P00. 30	Terminal UP/DOWN integral speed	0. 1～50. 0s	2. 0s	○	0x001E
P00. 31	Parameter lock	0： Invalid parameter lock 1： Valid parameter lock. All the parameters cannot be modified except this parameter. 2： The function code of initialization is not allowed.	0	○	0x001F
P00. 32	Reserved			●	
P00. 33	Motor parameter auto-tuning	0：No operation 1：Static auto-tuning 2：Dynamic auto-tuning	0	◎	0x0021
P00. 34	Motor selection	0：Motor 1 1：Motor 2	0	◎	0x0022
P00. 35	Parameter copy	0：No function	0	◎	0x0023

		1：Parameter upload 2：Parameter download（including motor parameters） 3：Parameter download（excluding motor parameters）			
P01 Start/stop control parameter group					
P01. 00	Start mode	0：Start with the starting frequency 1：Start after DC braking	0	◎	0x0100
P01. 01	Startup frequency	0. 00Hz~10. 00Hz	0. 00Hz	○	0x0101
P01. 02	Startup frequency holding time	0. 0s~60. 0s	0. 0s	○	0x0102
P01. 03	Startup DC braking current	0. 0%～100. 0%	0. 0%	○	0x0103
P01. 04	Startup DC braking holding time	0. 0s~60. 0s	0. 0s	○	0x0104
P01. 05	Stop mode	0：Decelerate to stop 1：Coast to stop	0	○	0x0105
P01. 06	Initial frequency of stop DC braking	0. 00Hz~P00. 08（max. output frequency）	0. 00Hz	○	0x0106
P01. 07	Reversed			●	
P01. 08	Stop DC braking current	0. 0%~100. 0%	0. 0%	○	0x0108
P01. 09	Stop DC braking time	0. 0s~60. 0s	0. 0s	○	0x0109
P01. 10	JOG running frequency	0. 00Hz~P00. 08（max. output frequency）	5. 00Hz	○	0x010A
P01. 11	JOG running acceleration time	0. 0s~6500. 0s	30. 0s	○	0x010B
P01. 12	JOG running deceleration time	0. 0s~6500. 0s	30. 0s	○	0x010C
P01. 13	Emergency stop deceleration time	0. 0s~6500. 0s	6. 0s	○	0x010D
P01. 14	Acceleration/Deceleration mode	0： Linear acceleration/deceleration 1： S-curve acceleration/deceleration	0	◎	0x010E
P01. 15	Time proportion of S-curve start segment	0. 0%~（100. 0%-P01. 16）（Relative to acceleration/deceleration time）	30. 0%	◎	0x010F
P01. 16	Time proportion of S-curve end segment	0. 0%~（100. 0%-P01. 15）（Relative to acceleration/deceleration time）	30. 0%	◎	0x0110
P01. 17	Jump frequency	0. 01Hz~P00. 08（max. output frequency）	0. 01Hz	○	0x0111
P01. 18	Frequency jump amplitude（+, -）	0. 00Hz~P00. 08（max. output frequency）	0. 00Hz	○	0x0112
P01. 19	Forward/Reverse rotation dead-zone time	0. 0s~3600. 0s	0. 0s	○	0x0113
P01. 20	Running mode when set frequency lower than frequency lower limit (Valid when lower limit larger than 0)	0：Run at frequency lower limit 1：Stop 2：Run at zero speed	0	○	0x0114

P01. 21	Run command selection at power-on	0：Valid 1：Invalid	0	○	0x0115
P01. 22~P01. 25		Reserved		●	
P01. 26	Restart after power failure	0：No act 1：Act	0	○	0x011A
P01. 27	Waiting time for restart	0. 0s~20. 0s	0.5	○	0x011B
P02 Motor 1 parameter group					
P02. 00	Motor 1 type selection	0：Common asynchronous motor 1：Variable frequency asynchronous motor	0	◎	0x0200
P02. 01	Rated power for motor 1	0. 4kW~1000. 0kW	Model dependent	◎	0x0201
P02. 02	Rated voltage for motor 1	1V~1500V	Model dependent	◎	0x0202
P02. 03	Rated current for motor 1	0. 1A~6553. 5A	Model dependent	◎	0x0203
P02. 04	Rated frequency for motor 1	0. 01Hz~500. 00Hz	Model dependent	◎	0x0204
P02. 05	Rated speed for motor 1	0RPM~65535RPM	Model dependent	◎	0x0205
P02. 06	Stator resistance for motor 1	0. 001Ω~65. 535Ω	Model dependent	◎	0x0206
P02. 07	Rotor resistance for motor 1	0. 001Ω~65. 535Ω	Model dependent	◎	0x0207
P02. 08	Leakage inductive reactance for motor 1	0. 01mH~655. 35mH	Model dependent	◎	0x0208
P02. 09	Mutual inductive reactance for motor 1	0. 1mH~6553. 5mH	Model dependent	◎	0x0209
P02. 10	No-load current for motor 1	0. 1A~P02. 03（Motor 1 rated current）	Model dependent	◎	0x020A
P02. 11~P02. 16		Reserved		●	
P02. 17	Mini. excitation at field weakening	50%~100%	50%	○	0x0211
P02. 18	Inductance coefficient 1 at field weakening	5000~20000	10000	○	0x0212
P02. 19	Inductance coefficient 2 at field weakening	5000~20000	12000	○	0x0213
P02. 20	Overload time coefficient	50. 0%~150. 0%	100. 0%	◎	0x0214
P02. 21	Overcurrent threshold	0：Enable 1：Disable	0	◎	0x0215
P02. 22	Protection selection	Unit's digit： Overvoltage protection 0： Fault occur and coast to stop 1： Disable fault alarm and continue operation	0X0	◎	0x0216

		Ten’s digit： Contact energizing protection 0：Fault occur and coast to stop 1：Disable fault alarm and continue operation Hundred’s digit： Input phase loss protection 0：Fault occur and coast to stop 1：Disable fault alarm and continue operation Thousand’s digit： Output phase loss protection 0：Fault occur and coast to stop 1：Disable fault alarm and continue operation			
P03 Motor 1 vector control parameter group					
P03. 00	Reserved			●	
P03. 01	Speed loop proportional gain 1	0. 1~500. 0	20. 0	○	0x0301
P03. 02	Speed loop integral time 1	0. 01s~10. 00s	0. 20s	○	0x0302
P03. 03	Switchover frequency 1	0. 00Hz~P03. 06	5. 00Hz	○	0x0303
P03. 04	Speed loop proportional gain 2	0. 1~500. 0	20. 0	○	0x0304
P03. 05	Speed loop integral time 2	0. 01s~10. 00s	0. 50s	○	0x0305
P03. 06	Switchover frequency 2	P03. 03~P00. 08（max. output frequency）	10. 00Hz	○	0x0306
P03. 07	Time constant of speed loop filter	1ms~500ms	1ms	○	0x0307
P03. 08	Field weakening torque compensation gain	0. 0%~100. 0%	100. 0%	○	0x0308
P03. 09	Motor slip gain	10. 0%~300. 0%	100.0%	○	0x0309
P03.10	Braking slip gain	10.0%~300.0%	100.0%	○	0x030A
P03.11	Upper limit source in speed control mode	0： Set in function code P03.12 1：AI 1 2：AI 2 3：AI 3 4：PULSE-I N pulse setting 5：MODBUS communication setting 6：MI N(AI 1，AI 2) 7：MAX(AI 1，AI 2) Notes: 0 to 7 full scale 100% corresponds to the twice of rated torque of motor 1.	0	◎	0x030B
P03.12	Upper limit value in speed control mode	0.0%~200.0%	180.0%	○	0x030C
P03.13	Current loop proportional coefficient	0.00~2.00	1.00	○	0x030D
P03.14	Current loop integral coefficient	0.00~2.00	1.00	○	0x030E

P04 Motor 1 V/F control parameters group					
P04. 00	V/F curve setting	0：V/F curve setting 1：Multi-point V/F 2：1. 2-power V/F 3：1. 4-power V/F 4：1. 6-power V/F 5：1. 8-power V/F 6：2. 0-power V/F 7：V/F separation	0	◎	0x0400
P04.01	Reserved	Parameter reserved	0	●	0x0401
P04.02	Multi-point V/F frequency 1	0.00Hz~P04.04	5.00Hz	◎	0x0402
P04.03	Multi-point V/F voltage 1	0.0%~100.0%	10.0%	◎	0x0403
P04.04	Multi-point V/F frequency 2	P04.02~P04.06	10.00Hz	◎	0x0404
P04.05	Multi-point V/F voltage 2	0.0%~100.0%	20.0%	◎	0x0405
P04.06	Multi-point V/F frequency 3	P04. 04~P04. 08	20.00Hz	◎	0x0406
P04.07	Multi-point V/F voltage 3	0.0%~100.0%	40.0%	◎	0x0407
P04.08	Multi-point V/F frequency 4	P04.06~P00.08（max. output frequency）	40.00Hz	◎	0x0408
P04.09	Multi-point V/F voltage 4	0.0%~100.0%	80.0%	◎	0x0409
P04. 10	Auto torque boost compensation coefficient	0~2000	0.0s	○	0x040A
P04. 11	V/F manual torque boost	0. 0%~30. 0%	0. 0%	○	0x040B
P04. 12	Reserved			●	0x040C
P04. 13	Field weakening torque compensation coefficient	0~2500	0	○	0x040D
P04. 14	Reserved			●	0x040E
P04. 15	Slip compensation gain	0. 0%~250. 0%	100. 0%	○	0x040F
P04. 16	Reserved			●	
P04. 17	Oscillation suppression gain	0. 0~30. 0	Model dependent	○	0x0411
P04. 18	Reserved			●	
P04. 19	Flux braking	0：Disable 1：Enable	1	○	0x0413
P04. 20	Voltage source for V/F separation	0：Function code setting（P04. 21） 1：AI 1 2：AI 2 3：AI 3 4：PULSE-I N pulse setting 5：PID 6：MODBUS communication setting Notes：For item 0 to 6, 100.0% of the setting in each mode corresponds to the rated motor voltage	0	◎	0x0414
P04.21	Voltage digital setting for	0.0%~100.0%	0.0%	○	0x0415

	V/F separation				
P04.22	Voltage rise time of V/F separation	0.0s~2000.0s	0.0s	○	0x0416
P04.23	Voltage decline time of V/F separation	0.0s~2000.0s	0.0s	○	0x0417
P04.24	Voltage lower limit of V/F separation	0.0%~P04.25	0.0%	○	0x0418
P04.25	Voltage upper limit of V/F separation	P04.24~100.0%	100.0%	○	0x0419
P04.26	Current limit	20. 0%~200. 0%	160.0%	○	0x041A
P04.27	Current limit switch	0: Current limit function enabled 1: Curent limit function disabled	0	○	0x041B
P04.28	VF torque filter coefficient	0-100	10	○	0x041C
P05 input terminal function parameters group					
P05.00	DI1(Digital input) function selection	0：No function 1：Forward RUN (FWD) 2：Reverse RUN (REV) 3：Three-line control 4：Forward JOG 5：Reverse JOG 6：Coast to stop 7：RUN pause(The inverter does not receive the start signal in the stop state. And the inverter is not affected in JOG mode.) 8：Fault reset 9：External fault input 10：Frequency setting UP 11：Frequency setting DOWN 12：Frequency UP/DOWN setting clear 13：Frequency UP/DOWN setting temporary clear 14：Multi-reference terminal 1 15：Multi-reference terminal 2 16：Multi-reference terminal 3 17：Multi-reference terminal 4 18：Acceleration/deceleration time selection 1 19：Acceleration/deceleration time selection 2 20：PID pause 21：Reverse PID action direction 22：PID parameter switchover 23：Immediate DC braking 24：Deceleration DC braking 25：External stop 26：Emergency stop（Acceleration time decided by P01.	1	◎	0x0500
P05.01	DI2(Digital input) function selection		2	◎	0x0501
P05.02	DI3(Digital input) function selection		4	◎	0x0502
P05.03	DI4(Digital input) function selection		6	◎	0x0503
P05. 04	DI5(Digital input) function selection		8	◎	0x0504
P05. 05	DI6(Digital input) function selection		9	◎	0x0505
P05. 06	HDI1 Digital input function selection (optional high-speed pulse input)		33	◎	0x0506

		13) 27：PLC status reset 28：PLC operation pause 29：Counter input（Input pulse less than 200Hz） 30：Counter reset 31：Length count input（DI length count pulse input less than 200Hz，or HDI must be used） 32：Length reset 33：High-speed pulse input（enabled only for HDI 1） 34：Swing pause（Pause at the current frequency） 35：Swing reset（return to center frequency） 36：Acceleration/Deceleration prohibited 37：Run prohibited(When this terminal is ON, the inverter coasts to stop at running.) 38：Speed control/Torque control switchover 39： Torque control prohibited 40： Switchover between frequency source 41： Switch running commands to operation panel 42：Switch running commands to terminal 43：Switch running commands to communication 44： Motor selection 45：Clear the current running time 46~63：Reserved			
P05. 07	DI1~DI4 Digital input Logic selection	Unit’s digit：DI1 setting 0： Valid at normally closed 1： Valid at normally open Ten’s digit：DI 2 setting Same as DI 1 Hundred’s digit：DI 3 setting Same as DI 1 Thousand’s digit：DI 4 setting Same as DI 1	0x0000	◎	0x0507
P05. 08	DI 5~HDI 1 Digital input Logic selection	Unit’s digit：DI 5 setting 0：Valid at normally closed 1：Valid at normally open Ten’s digit：DI 6 setting Same as DI 5 Hundred’s digit：HDI 1 setting Same as DI 5 Thousand’s digit：Reserved	0x0000	◎	0x0508
P05. 09	Reserved			●	
P05. 10	DI filter time	0. 00s~10. 00s	0.01s	○	0x050A
P05. 11	Terminal command mode	0: Two-line mode 1	0	◎	0x050B

		1: Two-line mode 2 2: Three-line mode 1 3: Three-line mode 2			
P05. 12	Reserved			●	
P05.13	AI1 voltage lower limit	0.00V~P05.15	0.00V	○	0x050D
P05.14	AI1 lower limit setting	-100.0%~100.0%	0.0%	○	0x050E
P05.15	AI1 voltage upper limit	P05.13~10.00V	10.00V	○	0x050F
P05.16	AI1 upper limit setting	-100.0%~100.0%	100.0%	○	0x0510
P05.17	AI1input filter time	0.00s~10.00s	0.10s	○	0x0511
P05.18	AI2 input selection	0： Voltage input 1： Current input	0	○	0x0512
P05.19	AI2 voltage lower limit	0.00V~P05.21	0.00V	○	0x0513
P05.20	AI2 voltage lower limit setting	-100.0%~100.0%	0.0%	○	0x0514
P05.21	AI2 voltage upper limit	P05.19~10.00V	10.00V	○	0x0515
P05.22	AI2 voltage upper limit setting	-100.0%~100.0%	100.0%	○	0x0516
P05.23	AI2 input filter time	0.00s~10.00s	0.10s	○	0x0517
P05.24	AI2 current lower limit	0.00mA~P05.26	0.00mA	○	0x0518
P05.25	AI2 current lower limit setting	-100.0%~100.0%	0.0%	○	0x0519
P05.26	AI2 current upper limit	P05.24~20.00mA	20.00mA	○	0x051A
P05.27	AI2 current upper limit setting	-100.0%~100.0%	100.0%	○	0x051B
P05.28	AI3 voltage lower limit	0.00V~P05.30	0.00V	○	0x051C
P05.29	AI3 voltage lower limit setting	-100.0%~100.0%	0.0%	○	0x051D
P05.30	AI3 voltage upper limit	P05.28~10.00V	10.00V	○	0x051E
P05.31	AI3 voltage upper limit setting	-100.0%~100.0%	100.0%	○	0x051F
P05.32	AI3 input filter time	0.00s~10.00s	0.10s	○	0x0520
P05.33	High-speed pulse input mini. frequency	0.00kHz~P05.35	0.00kHz	○	0x0521
P05.34	High-speed pulse input mini. frequency setting	-100.0%~100.0%	0.0%	○	0x0522
P05.35	High-speed pulse input max. frequency	P05.33~100.00kHz	50.00kHz	○	0x0523
P05.36	High-speed pulse input max. frequency setting	-100.0%~100.0%	100.0%	○	0x0524
P05.37	High-speed pulse input filter time	0.00s~10.00s	0. 1s	○	0x0525
P06 output terminal parameter group					

P06.00	HDO1 output mode selection	0：Digital output（Switching） 1：PULSE-OUT	0	○	0x0600
P06. 01	Reserved			●	
P06. 02	Digital output logic selection	Unit’s digit：DO1 setting 0：Valid at normally closed 1：Valid at normally open Ten’s digit：Relay 1 setting Same as DO1 Hundred’s digit：HDO1 setting Same as DO1 Thousand’s digit：Reserved	0x0000	○	0x0602
P06.03	Digital output(DO1)	0：No output 1： Ready for RUN 2： Inverter running 3： Inverter forward rotation 4： Inverter reverse rotation 5：Zero-speed running1（no output at stop） 6：Zero-speed running 2（output at stop） 7：Fault output 8：Overload pre-warning 9：Lightload pre-warning 10： Undervoltage state output 11：Reserved 12：Inverter overheat warning 13：PLC stage complete 14： PLC cycle complete 15： Frequency limited 16：Torque limited 17： Speed limited 18： Upper limit frequency reached 19： Lower limit frequency reached 20：Set frequency reached 21： Frequency-level detection FDT1 output 22：Frequency-level detection FDT2 output 23：Arbitrary frequency reached 24：PID feedback loss 25：Set count value reached 26：Designated count value reached 27：Length reached 28：PID feedback overlimit 29：Current running time reached 30：Current power-on time reached 31：Accumulative running time reached	0	○	0x0603
P06.04	Relay T1 digital output		0	○	0x0604
P06. 05	Digital output (HDO1)		0	○	0x0605

		32：Accumulative power-on time reached 33：Communication setting 34: Fault output 2 34~40：Reserved			
P06.06	Reserved			●	
P06.07	DO1 Digital output delay ON	0.0s~6000.0s	0.0s	○	0x0607
P06.08	DO1 Digital output delay OFF	0.0s~6000.0s	0.0s	○	0x0608
P06.09	Relay T1 output delay ON	0.0s~6000.0s	0.0s	○	0x0609
P06.10	Relay T1 output delay OFF	0.0s~6000.0s	0.0s	○	0x060A
P06.11	HDO1 Digital output delay ON	0.0s~6000.0s	0.0s	○	0x060B
P06.12	HDO1 Digital output delay OFF	0.0s~6000.0s	0.0s	○	0x060C
P06.13	Reserved			●	
P06.14	AO1 function selection	0：Running frequency 1：Set frequency 2：Output current 1（Relative value） 3：Output voltage 1（Relative value） 4：Output torque 5：Output power 6：PULSE-I N 7：ABS（AI 1） 8：ABS（AI 2） 9：ABS（AI 3） 10：Length 11：Count value 12：Motor rotational speed 13：Output current 2（Absolute value） 14：Output voltage 2（Absolute value） 15：Communication setting percentage	0	○	0x060E
P06. 15	AO2 function selection		1	○	0x060F
P06. 16	HDO1 pulse output function selection		2	○	0x0610
P06.17	AO1 output voltage lower limit	0.00V~P06.19	0.00V	○	0x0611
P06.18	AO1 output voltage lower limit setting	0.0%~100.0%	0.0%	○	0x0612
P06.19	AO1 output voltage upper limit	P06.17~10.00V	10.00V	○	0x0613
P06.20	AO1 output voltage upper limit setting	0.0%~100.0%	100.0%	○	0x0614
P06.21	AO2 output voltage lower limit	0.00V~P06.23	0.00V	○	0x0615
P06.22	AO2 output voltage lower	00.0%~100.0%	0.0%	○	0x0616

	limit setting				
P06.23	AO2 output voltage upper limit	P06.21~10.00V	10.00V	○	0x0617
P06.24	AO2 output voltage upper limit setting	0.0%~100.0%	100.0%	○	0x0618
P06.25	HDO1 mini. output set frequency	0.01kHz~100.00kHz	0.01kHz	○	0x0619
P06.26	HDO1 mini. output set value	0.0%~P06.28	0.0%	○	0x061A
P06.27	HDO1 max. output set frequency	0.01kHz~100.00kHz	50.00kHz	○	0x061B
P06.28	HDO1 max. output set value	P06.26~+100.0%	100.0%	○	0x061C
P08 Process Control PID Function					
P08. 00	PID setting source	0：Set in P08. 01 1：AI 1 2：AI 2 3：AI 3 4：PULSE-I N 5：Multi-reference 6：MODBUS communication setting	0	○	0x0800
P08.01	PID digital setting	0.0%~100.0%	50.0%	○	0x0801
P08. 02	PID feedback source	0：AI 1 1：AI 2 2：AI 3 3：PULSE-I N 4：AI 1-AI 2 5：AI 1+AI 2 6：MAX(AI 1，AI 2) 7：MI N(AI 1，AI 2) 8：MODBUS communication setting	0	○	0x0802
P08. 03	PID action direction	0：Forward action（Negative feedback） 1：Reverse action（Positive feedback）	0	○	0x0803
P08.04	PID setting feedback range	0.0~6553.5（user-defined unit）	100.0	○	0x0804
P08.05	Proportional gain 1	0.0~100.0	20.0	○	0x0805
P08.06	Integral time1	0.01s~10.00s	2.00s	○	0x0806
P08.07	Differential time 1	0.000s~10.000s	0.000s	○	0x0807
P08.08	Proportional gain 2	0.0~100.0	20.0	○	0x0808
P08.09	Integral time2	0.01s~10.00s	2.00s	○	0x0809
P08.10	Differential time 2	0.000s~10.000s	0.000s	○	0x080A
P08. 11	PID parameter switchover condition	0: No switchover 1: Switchover via DI	0	○	0x080B

		2: Automatic switchover based on deviation			
P08.12	PID parameter switchover deviation	0.0%～100%	20.0%	○	0x080C
P08.13	PID deviation limit	0.0%～100%	0.0%	○	0x080D
P08.14	PID preset output value	0.0%~100.0% (Relative to max. output frequency P00.08)	10.0%	○	0x080E
P08.15	PID preset output value holding time	0.0s~6000.0s	0.0s	○	0x080F
P08.16	Detection value of feedback loss	0.0%~100.0%	0.0%	○	0x0810
P08.17	Detection time of feedback loss	0.0s~60.0s	1.0s	○	0x0811
P08.18	Detection value of feedback over-limit	0.0%~100.0%	100.0%	○	0x0812
P08.19	Detection time of feedback over-limit	0.0s~60.0s	1.0s	○	0x0813
P08.20	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	0	○	0x0814
P08.21	Maximum value of PID outputs in reverse direction	0.0%： PID outputs in reverse direction not allowed 0.1%~100.0%： 100% Correspond to max. output frequency P00.08 when PID outputs used as frequency source	0.0%	○	0x0815
P09 special function parameter					
P09.00	Frequency detection value 1（FDT1）	0.00Hz~P00.08（max. output frequency）	50.00Hz	○	0x0900
P09.01	Frequency detection hysteresis（FDT hysteresis 1）	0.0%~100.0%（relative to FDT1）	5.0%	○	0x0901
P09.02	Frequency detection value 2（FDT2）	0.00Hz~P00.08（max. output frequency）	25.00Hz	○	0x0902
P09.03	Frequency detection hysteresis（FDT hysteresis 2）	0.0%~100.0%（relative to FDT2）	5.0%	○	0x0903
P09.04	Detection range of frequency reached	0.00Hz~P00.08（max. output frequency）	2.50Hz	○	0x0904
P09.05	Swing frequency setting mode	0：Relative to the central frequency（the current set frequency） 1：Relative to the maximum frequency P00.08	0	○	0x0905
P09.06	Swing frequency amplitude	0.0%： Swing frequency OFF 0.1%~100.0%	0.0%	○	0x0906
P09.07	Jump frequency amplitude	0.0%~50.0%	0.0%	○	0x0907
P09.08	Swing frequency rising	0.1s~3000.0s	5.0%	○	0x0908

	time				
P09.09	Swing frequency falling time	0.1s~3000.0s	5.0s	○	0x0909
P09.10	Set length	0~60000（user-defined unit）	1000 unit	○	0x090A
P09.11	Number of pulses per length unit (unit 0.1)	0.1~6553.5	100	○	0x090B
P09.12	Reserved			●	0x090C
P09.13	Set count value	1~60000	1000	○	0x090D
P09.14	Designated count value	1~60000	1000	○	0x090E
P09.15	Droop control	0.00Hz~10.00Hz	0.00Hz	○	0x090F
P09.16	Accumulative running time reached	0h~60000h	0h	○	0x0910
P09.17	Accumulative power-on time reached	0h~60000h	0h	○	0x0911
P09.18	Current running time reached	0min~60000min	0min	○	0x0912
P09.19	Current power-on time reached	0min~60000min	0min	○	0x0913
P09. 20	Action after accumulative power-on/running time reached	Unit’s digit：Accumulative power-on time reached 0：only output DO 1：Output DO and fault to coast to stop Ten’s digit：Accumulative running time reached 0：Only output DO 1：Output DO and fault to coast to stop	0x00	○	0x0914
P09.21	Frequency reached	0.00HZ~max. output frequency	50.00Hz	○	0x0915
P09.22	Detection range of frequency reached	0.00HZ~P09.21	2.50Hz	○	0x0916
P10 Operation panel and display parameters					
P10.00	User password	0~65535（This function code cannot be accessed in communication）	0	○	
P10. 01	STOP/RESET key function	0: STOP/RESET key enabled only in operation panel control 1: STOP/RESET key enabled in any operation mode	0	○	0x0A01
P10. 02	FUN Key function selection	0：No function 1：Forward JOG 2：Reverse JOG 3：Emergency stop 4：Coast stop 5：Switchover of operation command (valid when pressing FUN key for 2s or more) 6：Clearing frequency UP/DOWN setting	1	◎	0x0A02
P10. 03	LED running display	Unit’s digit： Setting display	0x4321	○	0x0A03

		0：Set frequency 8：PI D setting 1：Running frequency 9：PI D feedback 2：Bus voltage A：Rotor speed 3：Output voltage B：DI input status 4：Output current C：DO output status 5：Output power D：AI1 voltage (V) 6：Output torque E：AI2 voltage (V) 7：Set torque F：AI3 voltage (V) Ten’s digit：Setting display Same as Unit’s digit setting. Hundred’s digit：Setting display Same as Unit’s digit setting. Thousand’s digit：Setting display Same as Unit’s digit setting.			
P10. 04	LED stop display	Unit’s digit：Display setting 0：Set frequency 6：PID setting 1：Bus voltage 7：PID feedback 2：AI1 voltage 8：Torque setting 3：AI2 voltage 9：Count value 4：AI3 voltage A~F：Reserved 5：DI input status Ten’s digit：Display setting Same as Unit’s digit. Hundred’s digit：Display setting Same as Unit’s digit. Thousand’s digit：Display setting Same as Unit’s digit.	0x3210	○	0x0A04
P10.05	Load speed display coefficient	0.0~1000.0%（User-defined unit）	100.0%	○	0x0A05
P11 Multi-Reference parameters					
P11. 00	Multi-Reference source 0	0：Set in P11. 01 1：AI 1 2：AI 2 3：AI 3 4：PULSE-I N 5：MODBUS communication setting 6：PID control 7: Digital setting +UP/DOWN	0	◎	0x0B00
P11.01	Reference 0	-100.0%~100.0% （100.0%: max. frequency P00.08）	0.0%	○	0x0B01
P11.02	Reference 1	-100.0%~100.0%	0.0%	○	0x0B02
P11.03	Reference 2	-100.0%~100.0%	0.0%	○	0x0B03
P11.04	Reference 3	-100.0%~100.0%	0.0%	○	0x0B04

P11.05	Reference 4	-100.0%~100.0%	0.0%	○	0x0B05
P11.06	Reference 5	-100.0%~100.0%	0.0%	○	0x0B06
P11.07	Reference 6	-100.0%~100.0%	0.0%	○	0x0B07
P11.08	Reference 7	-100.0%~100.0%	0.0%	○	0x0B08
P11.09	Reference 8	-100.0%~100.0%	0.0%	○	0x0B09
P11.10	Reference 9	-100.0%~100.0%	0.0%	○	0x0B0A
P11.11	Reference 10	-100.0%~100.0%	0.0%	○	0x0B0B
P11.12	Reference 11	-100.0%~100.0%	0.0%	○	0x0B0C
P11.13	Reference 12	-100.0%~100.0%	0.0%	○	0x0B0D
P11.14	Reference 13	-100.0%~100.0%	0.0%	○	0x0B0E
P11.15	Reference 14	-100.0%~100.0%	0.0%	○	0x0B0F
P11.16	Reference 15	-100.0%~100.0%	0.0%	○	0x0B10
P12 Simple PLC function parameters					
P12. 00	Simple PLC running mode	0: Stop after the inverter runs one cycle 1: Keep final values after the inverter runs one cycle 2: Repeat after the inverter runs one cycle	0	○	0x0C00
P12. 01	Simple PLC retentive selection	0： Not retentive upon power-failure and stop 1： Not retentive upon stop, retentive upon power-failure 2： Retentive upon stop, not retentive upon power-failure 3： Retentive upon power-failure and stop	0	○	0x0C01
P12. 02	Time unit of simple PLC running	0：s（second） 1：mi n（minute） 2：h（hour）	0	○	0x0C02
P12. 03	Reserved			●	
P12.04	Running time of simple PLC reference 0	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C04
P12.05	Acceleration/deceleration time of simple PLC reference 0	0~3	0	○	0x0C05
P12.06	Running time of simple PLC reference 1	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C06
P12.07	Acceleration/deceleration time of simple PLC reference 1	0~3	0	○	0x0C07
P12.08	Running time of simple PLC reference 2	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C08
P12.09	Acceleration/deceleration time of simple PLC reference 2	0~3	0	○	0x0C09
P12.10	Running time of simple PLC	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C0A

	reference 3				
P12.11	Acceleration/deceleration time of simple PLC reference 3	0~3	0	○	0x0C0B
P12.12	Running time of simple PLC reference 4	0.0s（min，h）~6553.5s（min，h）	0.0s（h）	○	0x0C0C
P12.13	Acceleration/deceleration time of simple PLC reference 4	0~3	0	○	0x0C0D
P12.14	Running time of simple PLC reference 5	0. 0s（mi n，h）~6553. 5s（mi n，h）	0.0s(min,h)	○	0x0C0E
P12.15	Acceleration/deceleration time of simple PLC reference 5	0~3	0	○	0x0C0F
P12.16	Running time of simple PLC reference 6	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C10
P12.17	Acceleration/deceleration time of simple PLC reference 6	0~3	0	○	0x0C11
P12.18	Running time of simple PLC reference 7	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C12
P12.19	Acceleration/deceleration time of simple PLC reference 7	0~3	0	○	0x0C13
P12.20	Running time of simple PLC reference 8	0. 0s（mi n，h）~6553. 5s（mi n，h）	0.0s(min,h)	○	0x0C14
P12.21	Acceleration/deceleration time of simple PLC reference 8	0~3	0	○	0x0C15
P12.22	Running time of simple PLC reference 9	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C16
P12.23	Acceleration/deceleration time of simple PLC reference 9	0~3	0	○	0x0C17
P12.24	Running time of simple PLC reference 10	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C18
P12.25	Acceleration/deceleration time of simple PLC reference 10	0~3	0	○	0x0C19
P12.26	Running time of simple PLC reference 11	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C1A
P12.27	Acceleration/deceleration time of simple PLC	0~3	0	○	0x0C1B

	reference 11				
P12.28	Running time of simple PLC reference 12	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C1C
P12.29	Acceleration/deceleration time of simple PLC reference 12	0~3	0	○	0x0C1D
P12.30	Running time of simple PLC reference 13	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C1E
P12.31	Acceleration/deceleration time of simple PLC reference 13	0~3	0	○	0x0C1F
P12.32	Running time of simple PLC reference 14	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C20
P12.33	Acceleration/deceleration time of simple PLC reference 14	0~3	0	○	0x0C21
P12.34	Running time of simple PLC reference 15	0.0s（min，h）~6553.5s（min，h）	0.0s(min,h)	○	0x0C22
P12.35	Acceleration/deceleration time of simple PLC reference 15	0~3	0	○	0x0C23
P13 Fault and protection function parameter					
P13. 00	Reserved			●	0x0D00
P13. 01	Overload warning selection	Unit’s digit： Detection selection 0： Always detect 1： Detect only at constant speed Ten’s digit： Detection condition selection 0： Relative to motor rated current 1： Relative to inverter rated current Hundred’s digit：Warning selection 0：No alarm and only DO output, and continue to run 1：Alarm and DO output simultaneously and coast to stop	0x0000	○	0x0D01
P13.02	Overload warning detection level	20.0%~200.0%	130.0%	○	0x0D02
P13.03	Detection time of overload warning	0.1s~60.0s	5.0s	○	0x0D03
P13. 04	Phase loss protection	Unit’s digit：Input phase loss protection 0：Enabled 1：Disabled Ten’s digit：Output phase loss protection 0：Enabled 1：Disabled	0x0000	○	0x0D04

P13.05	Light load warning selection	Unit’ digit：Detection selection 0：Always detect 1：Detect only at constant speed Ten’s digit： Detection condition selection 0： Relative to motor rated current 1： Relative to inverter rated current Hundred’s digit：Warning selection 0：No alarm and only DO output, and continue to run 1：Alarm and DO output simultaneously and coast to stop	0x0000	○	0x0D05
P13.06	Light load warning detection level	0.0%~200.0%	30.0%	○	0x0D06
P13.07	Detection time of light load warning	0.1s~60.0s	5.0s	○	0x0D07
P13.08	Reserved			●	0x0D08
P13.09	Short-circuit to ground upon power-on	0：Disabled 1：Enabled	1	○	0x0D09
P13. 10~P13. 16		Reserved			
P13.17	Cooling fan control	0： Fan working during running 1： Fan working continuously	0	○	0x0D11
P13.18	Reserved				
P13.19	Under-voltage setting	50%~100% （Relative to the under-voltage point at standard input）	60%	○	0x0D13
P13.20	Fault auto reset times	0~20	0	○	0x0D14
P13.21	DO action during fault auto reset	0：Not act 1：Act	0	○	0x0D15
P13.22	Time interval of fault auto reset	0.1s~60.0s	1.0s	○	0x0D16
P13. 23	voltage adjustment selection	Unit’s digit： Overvoltage stall adjustment 0： Disabled 1： Enabled Ten’s digit： Undervoltage adjustment 0：Disabled 1：Enabled Hundred’s digit： Over modulation selection 0：Disabled 1：Enabled Thousand’s digit：Reserved	0x0001	○	0x0D17
P13.24	Overvoltage stall protective voltage	110%~150%	130%	○	0x0D18
P13.25	Energy braking action selection	0：Disabled 1：Enabled	0	○	0x0D19

P13.26	Energy braking protective voltage	110%~150%	130%	○	0x0D1A
P13.27	Overvoltage stall gain	0~200%	50%	◎	0x0D1B
P13. 28~P13. 29		Reserved		●	
P13.30	Fault record selection	0~3 (0: Current fault, 1: Last fault, 2: Last but one, …, The bigger the ID number is, the earlier fault occurs)	0	○	0x0D1E
P13.31	Fault code			●	0x0D1F
P13.32	Running frequency upon fault			●	0x0D20
P13.33	Output current upon fault			●	0x0D21
P13.34	Bus voltage upon fault			●	0x0D22
P13.35	Output voltage upon fault			●	0x0D23
P13.36	Input terminal status upon fault			●	0x0D24
P13.37	Output terminal status upon fault			●	0x0D25
P13.38	Module temperature			●	0x0D26
P13.39	Accumulative running time upon fault (hour)			●	0x0D27
P13.40	Accumulative running time upon fault (second)			●	0x0D28
P14 communication parameters					
P14. 00	Reserved			●	
P14. 01	Baud rate	0: 2400bps 1: 4800bps 2: 9600bps 3: 19200bps 4: 38400bps 5: 57600bps	2	○	0x0E01
P14. 02	Data format	0: No parity (N, 8, 1),RTU 1: Even parity (E, 8, 1),RTU 2: Odd parity (O, 8, 1),RTU 3: No parity (N, 8, 2),RTU 4: Even parity (O, 8, 2),RTU 5: Odd parity (E, 8, 2),RTU	0	○	0x0E02
P14.03	Local address	0: Broadcast address 1~247: Slave address	1	○	0x0E03
P14.04	Response delay	0ms~200ms	0ms	○	0x0E04
P14.05	Communication timeout	0.0s: No detect 0.1s~60.0s	0.0s	○	0x0E05
P14.06	Communication fault processing	0: No alarm and continue to operate 1: Alarm occurs and coast to stop	0	○	0x0E06

P20 Motor 2 parameters					
P20.00	Motor 2 type selection	0：Common asynchronous motor 1：Variable frequency asynchronous motor	0	◎	0x1400
P20.01	Rated power for motor 2	0.4kW~1000.0kW	Model dependent	◎	0x1401
P20.02	Rated voltage for motor 2	1V~1500V	Model dependent	◎	0x1402
P20.03	Rated current for motor 2	0.1A~6553.5A	Model dependent	◎	0x1403
P20.04	Rated frequency for motor 2	0. 01Hz~500. 00Hz	Model dependent	◎	0x1404
P20.05	Rated speed for motor 2	0RPM~65535RPM	Model dependent	◎	0x1405
P20.06	Stator resistance for motor 2	0.001Ω~65.535Ω	Model dependent	◎	0x1406
P20.07	Rotor resistance for motor 2	0.001Ω~65.535Ω	Model dependent	◎	0x1407
P20.08	Leakage inductive reactance	0.01mH~655.35mH	Model dependent	◎	0x1408
P20.09	Mutual inductive reactance	0.1mH~6553.5mH	Model dependent	◎	0x1409
P20.10	No-load current for motor 2	0.1A~P02.03（Motor 1 rated current）	Model dependent	◎	0x140A
P20. 11~P20. 16		Reserved		●	
P20.17	Mini. excitation at field weakening	50%~100%	50%	○	0x1411
P20.18	Inductance coefficient 1 at field weakening	5000~20000	10000	○	0x1412
P20.19	Inductance coefficient 2 at field weakening	5000~20000	12000	○	0x1413
P20. 20~P20. 24		Reserved		●	
P20. 25	Motor 2 control mode	0：V/F control 1：Sensorless vector control(SVC) 2：Feedback vector control(FVC)	0	◎	0x1419
P20. 26	Motor 2 acceleration/ deceleration time	0：Acceleration/Deceleration time 1 1：Acceleration/Deceleration time 2 2：Acceleration/Deceleration time 3 3：Acceleration/Deceleration time 4 Notes: This setting decides the acceleration /deceleration time when PLC not run and terminal not act.	1	○	0x141A
P20. 27	Motor 2	0： Same direction	0	○	0x141B

	Rotation direction selection	1： Reverse direction 2： Direction prohibition			
P21 Motor 2 vector control parameters					
P21.00	Reserved			●	
P21.01	Speed loop proportional gain 1	0.1~500.0	20.0	○	0x1501
P21.02	Speed loop integral time 1	0.01s~10.00s	0.20s	○	0x1502
P21.03	Switchover frequency 1	0.00Hz~P21.06	5.00Hz	○	0x1503
P21.04	Speed loop proportional gain 2	0.1~500.0	20.0	○	0x1504
P21.05	Speed loop integral time 2	0.01s~10.00s	0.50s	○	0x1505
P21.06	Switchover frequency 2	P21.03~P00.08（maximum output frequency）	10.00Hz	○	0x1506
P21.07	Speed loop filter time	1ms~500ms	1ms	○	0x1507
P21.08	Field weakening torque compensation gain	0.0%~100.0%	100.0%	○	0x1508
P21.09	Motor slip gain	10.0%~300.0%	100.0%	○	0x1509
P21.10	Braking slip gain	10.0%~300.0%	100.0%	○	0x150A
P21. 11	Torque upper limit source in speed control mode	0：Set by P21.12 1：AI1 2：AI2 3：AI3 4：PULSE-IN 5：MODBUS communication setting 6：MIN(AI1，AI2) 7：MAX(AI1，AI2) Note： 100% corresponds to the twice of the motor 1 rated torque for 1~6 full scale.	0	◎	0x150B
P21.12	Digital setting of torque upper limit in speed control mode	0.0%~200.0%	180.0%	○	0x150C
P21.13	Current loop proportional coefficient	0.00~2.00	1.00	○	0x150D
P21.14	Current loop integral coefficient	0.00~2.00	1.00	○	0x150E
P022 Motor 2 V/F control parameter					
P22. 00	V/F curve setting	0：Linear V/F 1：Multi-point V/F 2：1.2-power V/F 3：1.4-power V/F 4：1.6-power V/F 5：1.8-power V/F	0	◎	0x1600

		6：2.0-power V/F 7：V/F separation			
P22.01	Reserved	0.00HZ~P00.08（max. output frequency）	10.00Hz	●	0x1601
P22.02	Multi-point V/F frequency 1	0.00Hz~P22.04	5.00Hz	◎	0x1602
P22.03	Multi-point V/F voltage 1	0.0%~100.0%	10.0%	◎	0x1603
P22.04	Multi-point V/F frequency 2	P22.02~P22.06	10.00Hz	◎	0x1604
P22.05	Multi-point V/F voltage 2	0.0%~100.0%	20.0%	◎	0x1605
P22.06	Multi-point V/F frequency 3	P22.04~P22.08	20.00Hz	◎	0x1606
P22.07	Multi-point V/F voltage 3	0.0%~100.0%	40.0%	◎	0x1607
P22.08	Multi-point V/F frequency 4	P22.06~P00.08（max. output frequency）	40.00Hz	◎	0x1608
P22.09	Multi-point V/F voltage 4	0.0%~100.0%	80.0%	◎	0x1609
P22.10	Reserved			●	
P22.11	V/F manual Torque boost	0.0%~30.0%	0.0%	○	0x160B
P22.12	Reserved			◎	0x160C
P22.13	Reserved			○	0x160D
P22.14	Reserved			○	0x160E
P22.15	Slip compensation gain	0.0%~250.0%	100.0%	○	0x160F
P22.16	Reserved			●	
P22.17	Oscillation suppression gain	0.0~10.0	Model dependent	○	0x1611
P22.18	Reserved			●	
P22.19	Flux braking	0：Disabled 1：Enabled	1	○	0x1613
P22. 20	Voltage source for V/F separation	0：Function code setting（P22. 21） 1：AI 1 2：AI 2 3：AI 3 4：PULSE-I N 5：PI D 6：MODBUS communication setting Note：100.0% corresponds to the rated motor voltage for 1 to 7.	0	◎	0x1614
P22.21	Voltage digital setting for V/F separation	0.0%~100.0%	0.0%	○	0x1615
P22.22	Voltage rise time of V/F separation	0.0s~2000.0s	0.0s	○	0x1616
P22.23	Voltage decline time of V/F separation	0.0s~2000.0s	0.0s	○	0x1617
P22.24	Voltage lower limit of Voltage decline time of V/F separation	0.0%~P22.25	0.0%	○	0x1618
P22.25	Voltage upper limit of	P22.24~100.0%	100.0%	○	0x1619

	Voltage decline time of V/F separation				
P22.26	Current limit	20.0%~200.0%	160.0%	○	0x161A
P24 Factory-defined parameters					
P26 Status monitoring parameters					
P26.00	Ser frequency			●	0x1A00
P26.01	Running frequency			●	0x1A01
P26.02	Bus voltage			●	0x1A02
P26.03	Output voltage			●	0x1A03
P26.04	Output current			●	0x1A04
P26.05	Output power			●	0x1A05
P26.06	Set torque（%）			●	0x1A06
P26.07	Output torque（%）			●	0x1A07
P26.08	PID setting			●	0x1A08
P26.09	PID feedback			●	0x1A09
P26.10	Output speed			●	0x1A0A
P26.11	DI state			●	0x1A0B
P26.12	DO state			●	0x1A0C
P26.13	AI1 input			●	0x1A0D
P26.14	AI2 input			●	0x1A0E
P26.15	AI3 input			●	0x1A0F
P26.16	AO1 output			●	0x1A10
P26.17	AO2 output			●	0x1A11
P26.18	Reserved			●	0x1A12
P26.19	PULSE-IN frequency (0.01KHz)			●	0x1A13
P26.20	PULSE-OUT frequency (0.01KHz)			●	0x1A14
P26.21	Count value			●	0x1A15
P26.22	Reserved			●	0x1A16
P26.23	Length value			●	0x1A17
P26.24	Load speed lower bytes			●	0x1A18
P26.25	Load speed high bytes			●	0x1A19
P26.26	PLC stage			●	0x1A1A
P26.27	Frequency source A			●	0x1A1B
P26.28	Frequency source B			●	0x1A1C
P26.29	Output synchronous frequency			●	0x1A1D
P26.30	Current running time			●	0x1A1E
P26.31	Current power-on time			●	0x1A1F
P26.32	Accumulative running time			●	0x1A20
P26.33	Accumulative power-on			●	0x1A21

	time				
P26.34	Product code			●	0x1A22
P26.35	Software version No. of drive			●	0x1A23
P26.36	Rated power of inverter			●	0x1A24
P26.37	Rated voltage of inverter			●	0x1A25
P26.38	Rated current of inverter			●	0x1A26
P26.39	Module temperature 1			●	0x1A27
P26.40	Module temperature 2			●	0x1A28
P26.41	Software version No. of operation panel			●	0x1A29
P26.42	Software code			●	0x1A2A

Chapter 6 Description of function codes

6.1 P00 Basic parameters

P00.00	Motor operation mode	Range：0～1	Default：0	◎

Select the operation mode for the inverter:

0：V/F control

It is applicable to applications with low accuracy requirements or applications where one inverter operates multiple motors, such as fan and pump.

1: Sensorless vector control(SVC)

It indicates open-loop vector control, and is applicable to high-performance control applications such as machine tool, centrifuge, wire drawing machine and injection moulding machine. One inverter can operate only one motor.

Notes: If vector control is used, motor auto-tuning must be performed because the advantages of vector control can only be utilized after correct motor parameters are obtained. Better performance can be achieved by adjusting vector control parameters (P03).

P00.01	Reserved			
P00.02	Command source selection	Range：0～2	Default：0	◎

Select Start/stop signal for inverter.

The control commands of inverter include run, stop, forward rotation, reverse rotation, jog operation and fault reset.

0: Operation panel control

Commands are given by pressing keys, such as FWD, REV, STOP / RESET on the operation panel. In the running statue, press STOP/RESET keys to stop the inverter(coast to stop or decelerate to stop)

1: Terminal control

Commands are given by means of multifunctional input terminals with functions such as forward rotation, reverse rotation, Forward JOG, and reverse JOG.

2: Communication control

Commands are given from host computer.

P00.03	Frequency source A	Range：0～9	Default：0	◎

It is used to select the setting channel of the frequency source A.

0：Digital setting(P00. 12) +Up/Down

By the value of function code P00. 12. “Setting frequency”, you can change the set frequency by the Turn button or UP/DOWN on the operation panel.

1: Set “Setting frequency “ by P00. 12

2: AI1 setting

3: AI2 setting

4: AI3 setting

The frequency is set by analog input. The inverter provides three-channel analog input: AI1 is 0～10V voltage input; AI2 is 0～10V or 0～20mA input (The voltage or current input can be selected by the short circuit cap on the control board); AI3 is -10V～+10V input.

When AI is used as the frequency setting source, the corresponding value 100% of the analog input corresponds to the maximum frequency of forward rotation, -100% corresponds to the maximum frequency of reverse rotation.

5：PULSE-IN

The frequency is set by HDI1 (high-speed pulse frequency). The corresponding value 100% of pulse setting corresponds to the max. frequency of forward rotation (function code P00. 08). For function code of high-speed pulse, refer to P05. 33～P05. 37.

6. Simple PLC

The auxiliary frequency setting value is set by simple PLC. For details, refer to the description of Group P12 function codes.

7. Multi-reference

The inverter support a maximum of 16 speeds implemented by the stated combinations of four DI terminals (1 ~4). The set frequency switchover can be done by the multi-reference terminals to perform the running or stop state. For details, refer to Group P11 function codes.

8：MODBUS communication setting

The current frequency of inverter is set by the host computer via RS485. For details of programming methods, operation and communication protocol, refer to the description of Appendix MODBUS.

9: PID setting

When selecting this parameter, the operation mode of inverter is process PID control. Here, you need to set the parameters of Group P8 “PID control”. The running frequency is the value after PID. For the details of PID setting, refer to the description of Group P8 “PID function”.

P00.04	Frequency source B	Range：0～8	Default：0	◎

0：Digital setting(P00. 12)

1：AI 1

2：AI 2

3：AI 3

4：PULSE-I N

5：Simple PLC

6：Multi-reference

7：MODBUS communication setting

8：PID

The setting of P00. 04 is same as the P00. 03.

P00.05	Frequency command operation	Range：0～11	Default：0	○

0：Frequency source A

Set by frequency command A.

1：Frequency source B

Set by frequency command B

2：Frequency source A+B

Set by frequency command A+B and limited by the upper/lower limit frequency P00. 09～P00. 11.

3：Frequency source A-B

Set by frequency command A-B and limited by the upper/lower limit frequency P00. 09～P00. 11. The operation results will result in forward or reverse running frequency.

4：MAX(A, B)

Take the largest absolute value in frequency A and frequency B as the set frequency and the operation result is limited by the upper and lower limit frequency.

5：MIN(A, B)

Take the smallest absolute value in frequency A and frequency B as the set frequency and the operation result is limited by the upper and lower limit frequency.

6：Switchover of frequency source A/B

7：A/A+B

8：A/A-B

9：A/MAX(A, B)

10：A/MIN(A, B)

When set the 6 ~10 to the P00. 05, switchover setting can be done by the terminal state.

11： Non-zero number for A, B frequency source, A comes first.

P00.06	Range base of frequency source B	Range：0～1	Default：0	○
P00.07	Range of frequency source B	Range：0%～150%	Default：100%	○

0：Relative to maximum frequency

Frequency source B is set by P00. 04(0～100. 0%) xP00. 08xP00. 07.

1：Relative to frequency source A

Frequency source B is set by P00. 04(0～100. 0%) xP00. 03(0～max. frequency)xP00. 07。

Notes：When the P00. 04 is set to 0(digital setting P00.12) or 7 (communication setting) to max. frequency, 100% corresponds to the value of this parameter.

P00.08	Maximum output frequency	Range：0.00～500.00Hz	Default：50.00Hz	◎

The maximum output frequency is the highest frequency the inverter allows to output.

P00.09	Frequency upper limit source	Range：0～5	Default：0	◎
P00.10	Frequency upper limit digital setting	Range：P00.11～P00.08	Default：50.00Hz	○

The frequency upper limit is the maximum frequency the inverter outputs for the user to run the device.

0：Frequency upper limit digital setting(Set by P00. 10)

1：AI 1

2：AI 2

3：AI 3

4：PULSE-I N pulse setting

5：MODBUS communication setting

The setting of 1 to 5 is same as P00. 03.

P00.11	Frequency lower limit	Range：0.00Hz～P00.10	Default：0.00Hz	○

The frequency lower limit is the minimum frequency the inverter outputs for the user to run the device. When the set frequency is lower than frequency lower limit, the inverter operates with the lower limit frequency.

Maximum output frequency ≥Frequency upper limit≥Frequency lower limit

P00.12	Set frequency	Range：0.00Hz～P00.08	Default：50.00Hz	○

The set frequency is decided by function code P00.12 when P00.03is set to 0~1 or P00.04 is set to 0. The value of this parameter is the initial value of digital setting of the inverter.

P00.13	Acceleration time0	Range：0～65000s	Default：Model dependent	○
P00.14	Deceleration time 0	Range：0～65000s	Default：Model dependent	○
P00.15	Acceleration time 1	Range：0～65000s	Default：Model dependent	○
P00.16	Deceleration time 1	Range：0～65000s	Default：Model dependent	○
P00.17	Acceleration time 2	Range：0～65000s	Default：Model dependent	○
P00.18	Deceleration time 2	Range：0～65000s	Default：Model dependent	○
P00.19	Acceleration time 3	Range：0～65000s	Default：Model dependent	○
P00.20	Deceleration time 3	Range：0～65000s	Default：Model dependent	○

P00.21	Acceleration/Deceleration time unit	Range：0～2	Default：0	○

The time unit of P00. 13～P00. 20 is decided by function code P00. 21.

0：0. 01s

1：0. 1s

2：1s

Acceleration time indicates the time required by the inverter to accelerate from 0 Hz to max. output frequency(P00.08) or set frequency. Deceleration time indicates the time required by the inverter to decelerate from max. output frequency(P00.08) or set frequency to 0 Hz.

As shown below:

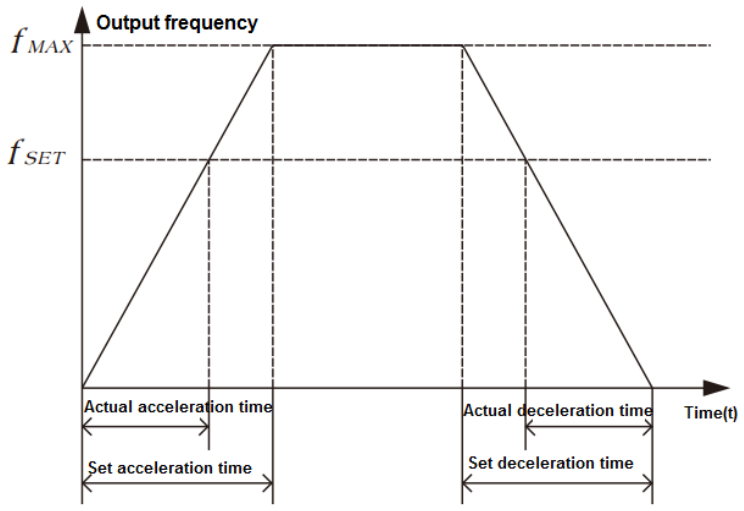


Figure 6-1 Relationship between maximum frequency and acceleration/deceleration time

P00.22	Acceleration/Deceleration time base frequency	Range：0～1	Default：0	◎

P00.22 acceleration/deceleration time base frequency decides the set acceleration/deceleration time that accelerates/decelerates from 0Hz to the max. frequency(P00.08) or set frequency.

0: Max. output frequency (P00.08)

The acceleration/deceleration time indicates the time for the inverter to increase from 0 Hz to the max. frequency. If the set target frequency is equal to the max. frequency, the actual acceleration/deceleration time is equal to the set acceleration/deceleration time. If the set target frequency is less than the max. frequency, the actual acceleration/deceleration time is also less than the set acceleration/deceleration time.

Actual acceleration/deceleration time=Set acceleration/deceleration time×(Set frequency/max. output frequency)

1: Fixed frequency((50. 00Hz)

The set acceleration/deceleration time indicates the time to accelerate from 0Hz to Fixed frequency (50. 00Hz)

P00.23	Parameter initialization	Range：0～4	Default：0	◎

0：No operation

1： Restore to factory default (no motor parameters)

Restore the parameters except parameters of motor, fault information (P13.31～P13.40) and operation panel display settings ((P10.03, P10.04).

2： Error clearing record

Clear the four groups of fault information.

3：Clear accumulative operation/power-on time

4：Restore to factory default (with motor parameters)

Restore the parameters(including motor parameters) , except the parameters of fault information and operation panel display settings.

P00.24	Rotation direction selection of motor 1	Range：0～2	Default：0	○

0：Same direction

The inverter runs as the actual operation direction at power-on.

1：Reverse direction

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

Notes: The motor will resume running in the original direction after parameter initialization. Do not use this function in applications where changing the rotating direction of the motor is prohibited after system commissioning is complete.

2：Reverse direction prohibition

The inverter outputs 0Hz, which is applicable for the special applications where reverse direction is prohibited.

P00.25	Carrier frequency setting	Range：1.0～16.0kHz	Default：Model dependent	○

It is used to adjust the carrier frequency of the inverter, helping to reduce the motor noise, avoiding the resonance of the mechanical system, and reducing the leakage current to the earth and interference generated by the inverter.

If the carrier frequency is low, output current has high harmonics, and the power loss and temperature rise of the motor increase.

If the carrier frequency is high, power loss and temperature rise of the motor declines.

However, the inverter has an increase in power loss, temperature rise and interference

Notes: When the inverter leaves the factory, the carrier frequency has been adjusted reasonably. So generally, users do not need to make changes.

Relationship between models and carrier frequency

Models	Max. carrier frequency (kHz)	Min. carrier frequency (kHz)	Default (kHz)
0.75～15 Kw	16	1	6
18.5～45 Kw	8	1	4
55～75 Kw	6	1	3
≥90kW	3	1	2

P00.26	Carrier frequency adjustment	Range：0x0000～0x0011	Default：0x0000	◎

Unit’s digit：Carrier frequency adjustment with temperature

0：Automatic adjustment

1：No adjustment

If set to 0, the inverter automatically reduces the carrier frequency when detecting that the heatsink temperature is high to prevent overheat. If the PWM carrier frequency change is not allowed, set to 1.

Ten’s digit：Carrier frequency adjustment with output frequency

0：Automatic adjustment

1：No adjustment

If set to 0, the inverter automatically reduces the carrier frequency to improve the low-speed load capability of motor when inverter operates at low speed. If the PWM carrier frequency change is not allowed, set to 1.

Hundred’s digit：Reserved

Thousand’s digit：Reserved

P00.27	PWM method	Range：0～1	Default：0	◎

0：Automatic switchover of five-segment and seven-segment

1：Five-segment

2: Seven-segment

This parameter is valid only for V/F control. When selecting 5-sgement, the temperature of the inverter is lower but output larger current harmonics; When selecting 7-segment, the temperature of the inverter is higher but output smaller current harmonics.

P00.28	Operation panel and terminal UP/DOWN frequency	Range：0x0000～0x1111	Default：0x0000	◎

The frequency of inverter can be adjusted by turn button on the operation panel and terminal UP/DOWN(frequency setting increasing/ frequency setting decreasing), which can be combined with any other frequency setting channels. This parameter is used to adjust the output frequency of inverter in system commissioning.

Notes: The frequency adjusted by the turn button on the operation panel and terminal UP/DOWN(frequency setting increasing/ frequency setting decreasing) is only valid for frequency source A.

Unit’s digit: Retentive function

0: Retentive at power-failure

The frequency adjusted by turn button and terminal UP/DOWN is memorized after power-failure. This frequency value will perform superposition with the set frequency of current channel at the next power-on, of which operation results can increase /decrease the frequency.

1: Non-retentive at power-failure

The frequency adjusted by turn button and terminal UP/DOWN won’t be memorized after power-failure. This frequency value do not perform superposition with the set frequency of current channel at the next power-on

Ten’s digit：Adjustment setting(Only for frequency source A)

0：Valid only when frequency source A P00. 03=0.

1：All settings of frequency source A is valid.

2：Setting prohibition

The adjusted frequency is invalid for frequency source and cannot change the setting of frequency source.

Hundred’s digit： Integral function

0：With integral function

For the terminal UP/DOWN adjustment, the terminal state continuous valid time is larger than the value set in P00.30,

the adjustment frequency starts to change. Take the 1/10 of P00.30 setting time as the base for every change, increase or decrease with 0.01Hz for the first change, then up to 10 times when valid time reaches P00.30 setting time and the max. change frequency is 1Hz.

1: No integral function

When the terminal of without integral function is valid, only the set value of p00.29 is changed.

Thousand’ s digit: Reverse direction change

0：Frequency reverse direction change prohibition

1：Frequency reverse direction change allowed

Notes: When the inverter is initialized, the adjustment frequency by the operation panel and terminal UP/DOWN will be automatically cleared to 0.

P00.29	Length of operation panel and terminal UP/DOWN per step	Range：0.01～5.00Hz	Default：0.01Hz	○

This parameter is the length of step at every change on the turn button and terminal without integral function.

P00.30	Terminal UP/DOWN integral speed	Range：0.1～50.0s	Default：2.0s	○

The time needed for frequency adjustment when using terminal with intergral function

Notes: For the terminal with integral function, when the continuous time is less than the value set in P00. 30, the frequency changes according to the value set in P00. 29.

P00.31	Parameter lock	Range：0～2	Default：0	○

0：Invalid parameter lock

1： Valid parameter lock. All the parameters cannot be modified except this parameter

2： The function code of initialization is not allowed.

P00.32	Reserved			
P00.33	Motor auto tuning	Range：0～2	Default：0	◎

The parameters motor needs can be automatically obtained by auto tuning and stored automatically after auto-tuning completion. And it is necessary to set the motor parameters correctly before auto-tuning(motor 1 P02. 01～P02. 05，motor 2 P20. 01～P20. 05)

0：No auto-tuning

Auto-tuning is prohibited.

1：Static auto-tuning

It is applicable for the applications where the motor cannot be disconnected from the load. Set this parameter to 1, and press RUN key. Then, the inverter starts static auto-tuning. After auto-tuning completes successfully, the P00.33 changes to 0 and the parameters of P02. 06～P02. 08 have been obtained and saved. The mutual inductance and no-load current of motor can not be measured and user can input corresponding value according to experience.

2：Dynamic auto-tuning

Ensure that the motor must be disconnected from the loads. Set P00.33 to 2 and press RUN key. The inverter performs static auto-tuning first and then accelerates to the fixed frequency with the set acceleration time. The inverter keeps running for a certain period and then decelerates to stop within the deceleration time. Then P00.33 changes to 0 after auto-tuning. The inverter will obtain the motor parameters of P02. 06 ～ P02. 10 and set the proper acceleration/deceleration time. If overcurrent or overvoltage occurs in auto-tuning, extend the acceleration/deceleration time properly.

P00.34	Motor selection	Range：0～1	Default：0	◎

0：Motor 1

The parameters of motor 1 should be set in Group P02.

1：Motor 2

The parameters of motor 2 should be set in Group P020.

It is available to input “motor selection” to select the current motor by switching and the terminal selection is priority to the setting of function code P00.34.

P00.35	Parameter copy	Range：0～3	Default：0	◎

0：No function；

1： Parameter upload

Upload parameters from group P00 to P23 to operation panel and save.

2：Parameter download（including motor parameters）

Download all the parameters stored in operation panel to inverter;

3：Parameter download（excluding motor parameters）

Download the parameters, excluding motor parameters, stored in operation panel to inverter

6. 2 P01 Start/stop control parameter

P01.00	Start mode	Range：0～1	Default：0	◎

Set the start mode for inverter.

0：Start with frequency：

Keep the inverter running for a certain period by the set startup frequency and holding time and then accelerate/decelerate , according to the slop set by acceleration/deceleration time. For details, refer to P01. 01.

1：DC braking before the start：

Output the DC current for a certain period by the current and holding time and start by method 0. For details, refer to P01. 03.

P01.01	Startup frequency	Range：0.00 Hz ~10.00Hz	Default：0.00Hz	○
P01.02	Startup frequency holding time	Range：0.0s~60.0s	Default：0.0s	○

Startup frequency is the initial frequency that inverter starts, as shown in following figure. Startup frequency holding time indicates the time for the inverter to operates at startup frequency. It is recommended to set 1Hz to 2Hz for the startup frequency and the digital value is larger for the small power.

For the application with small power, setting startup frequency is helpful to start the motor rapidly. For the application with big power and heavy-load, extending properly the startup frequency holding time is helpful for the pre-excitation of motor, reducing the start current and improving start torque. If the motor still rotates at startup, the motor speed can be reduced and then accelerates to operate.

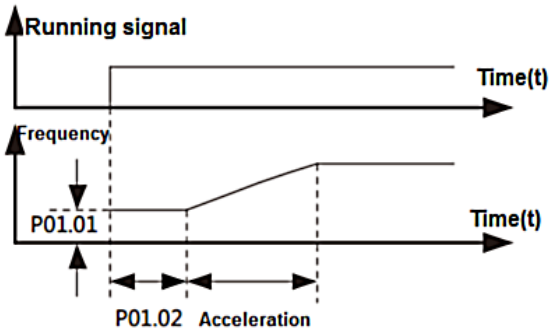


Figure 6-2 Startup frequency

P01.03	Startup DC braking current	Range：0.0%~100.0%	Default：0.0%	○
P01.04	Startup DC braking holding time	Range：0.0s~60.0s	Default：0.0s	○

DC braking before startup is the DC current output for a period time before motor rotates. Set the DC current to P01.03, which is 100% relative to the rated current of inverter. Set the time for the DC current in P01.04. The electromagnetic braking and pre-excitation of motor can be realized by input the DC current. For the applications with large power and load, by using pre-excitation, the larger startup torque is, the smaller the inrush current is.

DC braking process before startup is shown below:

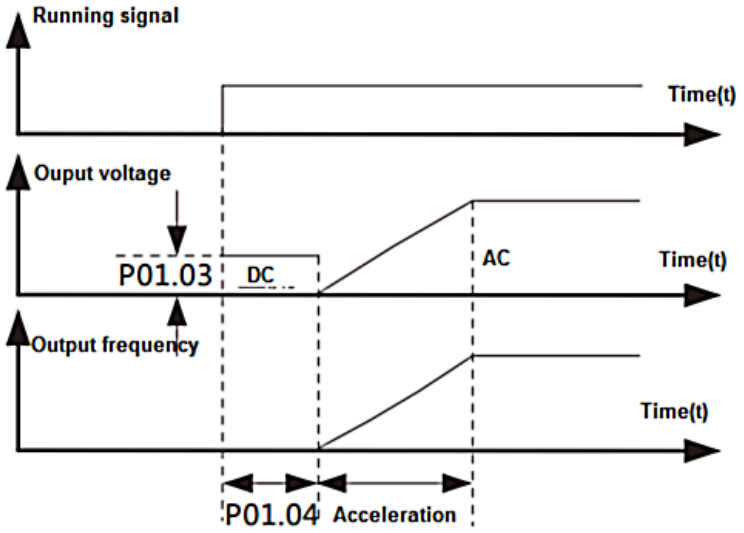


Figure 6-3 DC braking before startup

P01.05	Stop mode	Range：0～1	Default：0	○

0：Decelerate to stop

1：Coast to stop

Coast to stop is that after the stop command is given, the inverter immediately stops the output. The motor will coast to stop based on the mechanical inertia. Decelerate to stop is that after the stop command is given, the inverter decreases the output according to the deceleration time and stops when the frequency decreases to zero.

⚠DANGER
• After coast to stop is given, the motor is still in high-speed rotation, which needs to prevent the equipment damage and personal injury caused by the motor.

P01.06	Initial frequency of stop DC	Range：0.00Hz~P00.08	Default：0.00Hz	○
P01.07	Reserved			
P01.08	Stop DC braking current	Range：0.0%~100.0%	Default：0.0%	○
P01.09	Stop DC braking holding ztime	Range：0.0s~60.0s	Default：0.0s	○

During the process of decelerating to stop, the inverter starts DC braking when the running frequency is lower than the value set in P01.06. This parameter P01.08 specifies the output current at DC braking and 100% relative to rated current of inverter. This parameter P01.09 specifies the holding time of DC braking. If it is set to 0, DC braking is cancelled.

The stop DC braking process is shown below.

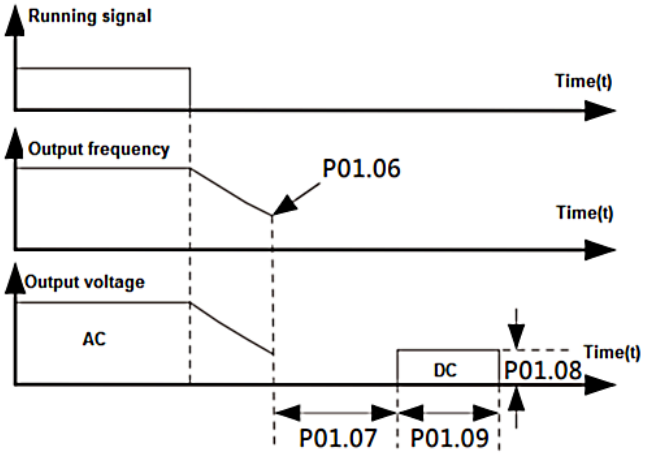


Figure 6-4 Stop DC braking process

During DC braking process, maintain a certain force on the rotor of the motor to prevent the rotor instability or creep after the stop.

P01.10	JOG running frequency	Range：0.00Hz~P00.08	Default：5.00Hz	○
P01.11	JOG running acceleration time	Range：0.0s~6500.0s	Default：30.0s	○
P01.12	JOG running deceleration time	Range：0.0s~6500.0s	Default：30.0s	○

Set the target frequency and acceleration/ deceleration time for the JOG running. JOG running acceleration time indicates the time that accelerates to the base frequency of P00.22. The JOG running command source is given by FUN key on operation panel, terminal forward rotation/reverse rotation or communication.

Notes: Ignore the startup frequency for JOG running and start from 0Hz.

P01.13	Emergency stop deceleration time	Range：0.0s～6500.0s	Default：6.0s	○

The inverter stops within this time when input “Emergency stop” by FUN key on the operation panel or switching. The deceleration time is the time that inverter needs to decelerates from max. frequency P00.08 to 0Hz. The emergency stop requires the equipment to stop quickly, so as to achieve the fast stop, it is necessary to increase the external braking unit to avoid the deceleration voltage.

P01.14	Acceleration/ Deceleration mode	Range：0～1	Default：0	◎

0：Linear acceleration/deceleration

1：S-curve acceleration/deceleration

It is used to set the frequency change mode during the acceleration/ deceleration process. When selecting linear acceleration/deceleration, the slope of the output frequency change remains unchanged and the slope is decided by acceleration/ deceleration time. When selecting S-curve acceleration/deceleration, the slope always starts from 0 when frequency changes. The slope also ends up with 0 after acceleration/ deceleration completion. Because of the continuous change of slope, the impact of the motor output on the load equipment is minimal. This mode is generally used in the applications where start and stop processes are relatively smooth, such as elevator and conveyor belt.

P01.15	Time proportion of S-curve start segment	Range：0.0%~（100.0%-P01.16）（Relative to acceleration/deceleration time）	Default：30.0%	◎
P01.16	Time proportion of S-curve end segment	Range：0.0%~（100.0%-P01.15）（Relative to acceleration/deceleration time）	Default：30.0%	◎

The parameter of P01.15 and P01.16 defines the change of S-curve, as shown below:

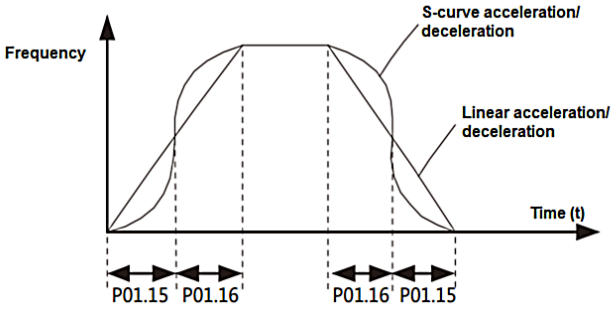


Figure 6-5 S-curve acceleration/ deceleration

Notes: These two parameters respectively define the time proportions of the start segment and the end segment of S-curve acceleration/deceleration. They must satisfy the requirement: P01.15 + P01.16 ≤ 100.0%.

P01.17	Jump frequency	Range：0.01Hz~P00.08	Default：0.01Hz	○
P01.18	Frequency jump amplitude（+, -）	Range：0.00Hz~P00.08	Default：0.00Hz	○

If the set frequency is within the frequency jump range, the actual running frequency is the jump frequency close to the set frequency. Setting the jump frequency helps to avoid the mechanical resonance point of the load

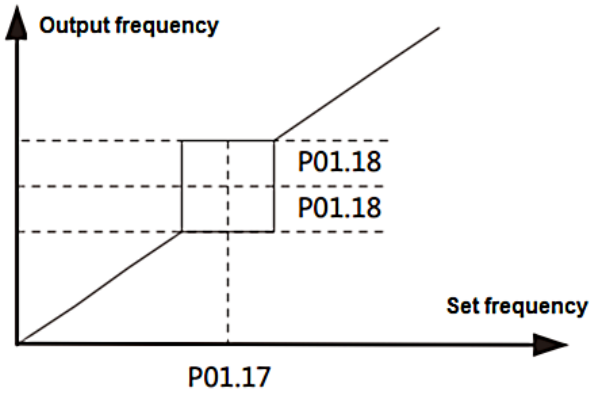


Figure 6-6 Principle of the jump frequencies

P01.19	Forward/Reverse rotation dead-zone time	Range：0.0s~3600.0s	Default：0.0s	○

It is used to set the time when the output is 0 Hz at transition of the inverter forward rotation and reverse rotation, as shown in the following figure

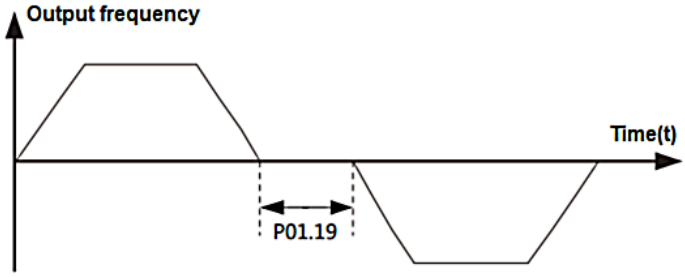


Figure 6-7 Forward/Reverse rotation dead-zone time

P01.20	Running mode when set frequency lower than frequency lower limit	Range：0~2	Default：0	○

0： Run at frequency lower limit

1：Stop

2：Run at zero speed

It is used to set the inverter running mode when the set frequency is lower than the frequency lower limit（P00. 11）.

Notes: If this parameter is set to 1, when the frequency is lower than the lower limit(P00.11), the inverter may not operate after Start command is given.

P01.21	Run command selection at power-on	Range：0~1	Default：0	○

0：Valid：

The Run command is always valid at inverter power-on or fault reset, that is the inverter starts the motor directly by the Run command. This may cause unexpected results or dangers.

1：Invalid：

If the run command is always valid at inverter power-on, the inverter doses not respond to the run command after power-on. After the run command is invalid for a certain period, the inverter begins to respond to the run command. In addition, when fault occurs, the run command must be invalid for a period of time, otherwise, the inverter does not respond to the run command.

P01. 22~P01. 25	Reserved

P01. 26	Restart after power failure	Range：0~1	Default：0	○

This parameter is used to restart inverter automatically after power failure.

0：No act. Inverter will not operate automatically when power ON again.

1：Act. Inverter operates automatically when power ON again.

If the command is set by terminal, the inverter will operate automatically only by detecting the terminal is ON after power ON again.

Please use this function carefully for safety.

.

P01. 27	Waiting time for restart	0. 0s~20. 0s	Default：0.5	○

When P01. 26 is set to 1, inverter begins to operate automatically after the waiting time when power ON again. The principle of setting up waiting time for restart is based on factors such as the recovery time of other equipment.

6. 3 P02 Motor 1 parameters

P02.00	Motor 1 type selection	Range：0~1	Default：0	◎

0： Common asynchronous motor

1： Variable frequency asynchronous motor

The main difference between the common asynchronous motor and the variable frequency asynchronous motor is the motor overload protection. The heat dissipation of common asynchronous motor is affected by rotating speed. The heat dissipation is poor at low speed, so de-rate the motor overload protection at low speed. The heat dissipation of variable frequency asynchronous motor is not affected by the rotating speed, so it is not necessary to de-rate the overload protection at low speed. Therefore, when driving common asynchronous motor, set P02.00 to 0 to ensure the reliable protection to the motor.

P02.01	Rated power	Range：0. 4～1000. 0Kw	Model dependent	◎
P02.02	Rated voltage	Range：1～1500V	Model dependent	◎
P02.03	Rated current	Range：0. 1～6553. 5A	Model dependent	◎
P02.04	Rated frequency	Range：0. 01～500. 00Hz	Model dependent	◎

P02.05	Rated speed	Range：0～65535rpm	Model dependent	◎

Notes: Set the parameters according to the motor nameplate. To achieve better control performance, motor auto-tuning is required. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

To ensure better control performance, configure the motor according to the standard adaptive motor of inverter. If the difference of motor power and standard adaptive motor is too large, the control performance of inverter will be decreased obviously. Generally, the running motor power should be one level higher than inverter power or motor power two levels lower than inverter power.

Notes: Resetting the rated power (P02.01) of the motor will initialize the motor parameters of P02.02 to P02.10.

P02.06	Stator resistance	Range：0.001～65.535Ω	Model dependent	◎
P02.07	Rotor resistance	Range：0.001～65.535Ω	Model dependent	◎
P02.08	Leakage inductive reactance	Range：0. 01～655. 35mH	Model dependent	◎
P02.09	Mutual inductive reactance	Range：0.1～6553.5mH	Model dependent	◎
P02.10	No-load current	Range：0. 1～P02. 03	Model dependent	◎

The setting values of P02.06 to P02.10 will be updated after motor auto-tuning completed. These parameters are the basic parameters of high-performance vector control and have a big impact on the control performance.

Notes: Take special attention to modify these parameters.

P02.11～P02.16	Reserved			
P02.17	Mini. excitation at field weakening	Range：50%～100%	Default：50%	◎
P02.18	Inductance coefficient 1 at field weakening	Range：5000～20000	Default：10000	◎
P02.19	Inductance coefficient 2 at field weakening	Range：5000～20000	Default：12000	◎
P02.20	Overload time coefficient	Range：50.0%～150.0%	Default：100.0%	◎

Set the overload protection time of the motor.

P02.21	Overcurrent threshold	Range：0～1	Default：0	◎

0：Enable the parameter of overcurrent threshold

1：Disable the parameter of overcurrent threshold

P02.22	Protection selection	Range：0x0000~0x1111	Default：0X0	◎

Unit's digit： Overvoltage protection

0： Fault occur and coast to stop

1： Disable fault alarm and continue operation

Ten’s digit： Contact energizing protection

0：Fault occur and coast to stop

1：Disable fault alarm and continue operation

Hundred’s digit： Input phase loss protection

0：Fault occur and coast to stop

1：Disable fault alarm and continue operation

Thousand’s digit： Output phase loss protection

0：Fault occur and coast to stop

1：Disable fault alarm and continue operation

6. 4 P03 Motor 1 vector control parameters

P03.00	Reserved			
P03.01	Speed loop proportional gain 1	Range：0.1～500.0	Default：20.0	○
P03.02	Speed loop integral time 1	Range：0.01～10.00s	Default：0.20s	○
P03.03	Switchover frequency 1	Range：0.00Hz～P03.06	Default：5.00Hz	○
P03.04	Speed loop proportional gain 2	Range：0.1～500.0	Default：20.0	○
P03.05	Speed loop integral time 2	Range：0.01～10.00s	Default：0.50s	○
P03.06	Switchover frequency 2	Range：P03.03～P00.08	Default：10.00Hz	○

The parameters above are valid for vector control, and invalid for V/F control. If the running frequency is less than or equal to "Switchover frequency 1"(P03. 03), the speed loop PI parameters are P03. 01 and P03. 02. If the running frequency is equal to or greater than "Switchover frequency 2"(P03. 05), the speed loop PI parameters are P03. 04 and P03. 05. If the running frequency is between P03.03 and P03.06, the speed loop PI parameters are obtained from the linear switchover between the two groups of PI parameters, as shown below.

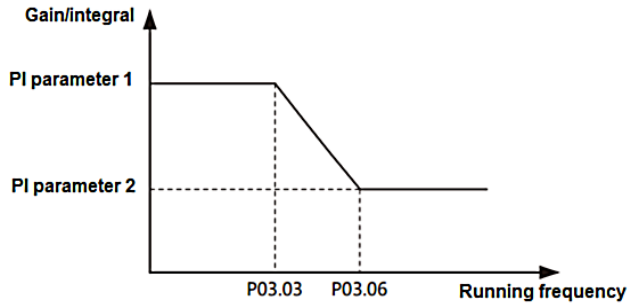


Figure 6-7 Speed loop parameter switchover

The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator. To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation. If the factory setting cannot meet the requirements, make proper adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot.

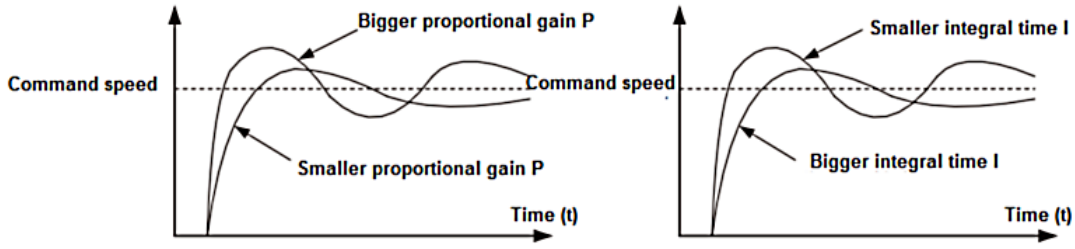


Figure 6-8 Speed loop PI parameters

P03.07	Speed loop filter time	Range：1～500ms	Default：1ms	○

Set the filter time of speed regulator and it is not necessary to modify this parameter without special requirements.

P03.08	Fielding weakening torque compensation gain	Range：0.0～100.0%	Default：100.0%	○

In the speed control mode of vector control, when the running frequency is greater than rated frequency of motor, set

proper compensation gain to improve the output torque and acceleration/ deceleration characteristics of motor.

P03.09	Motor slip gain	Range：10.0～300.0%	Default：100.0%	○
P03.10	Braking slip gain	Range：10.0～300.0%	Default：100.0%	○

Electric slip gain: In vector control, change the parameters to adjust speed stability accuracy of the motor with electric load. When the motor with load runs at a very low speed, increase the value of this parameter; when the motor with load runs at a very large speed, decrease the value of this parameter.

Braking slip gain: In vector control, change the parameters to adjust speed stability accuracy of the motor with power carrying load. When the motor with load runs at a very low speed, increase the value of this parameter; when the motor with load runs at a very large speed, decrease the value of this parameter.

P03.11	Torque upper limit source in speed control mode	Range：0～7	Default：0	○

In the speed control mode, the maximum output torque of the Inverter is restricted by P03. 11.

0： Set in P03. 12

The output torque is restricted by P03.13 digital setting.

1：AI 1

2：AI 2

3：AI 3

Take the analog input as the torque limit

4：PULSE-I N

Take the high-speed pulse input as the torque limit

5：MODBUS communication setting

Take communication setting as torque limit.

6：MI N(AI 1，AI 2)

7：MAX(AI 1，AI 2)

Take the minimum or maximum value in AI 1 and AI2 respectively as the torque limit.

Notes: When item 0 to 7 is set, 100% of the setting corresponds to the value of P03. 12

P03.12	Digital setting of torque upper limit in speed control mode	Range：0.0～200%	Default：180.0%	○

When set P03. 11 to 0, the torque limit in the speed control mode is decided by P03. 12. When P03. 11 to 1 ~7, 100% of the value P03. 12 corresponds to the setting value.

P03.13	Current loop proportional coefficient	Range：0.00～2.00	Default：1.00	○
P03.14	Current loop integral coefficient	Range：0.00～2.00	Default：1.00	○

These are current loop PI parameters for vector control. Increasing current loop proportional coefficient or decreasing integral coefficient will improve dynamic response of system torque; Decreasing current loop proportional coefficient or increasing integral coefficient will improve the stability of system. Improper setting will lead to oscillation of the entire control loop.

6.5 P04 Motor 1 V/F control parameters

P04.00	V/F curve setting	Range：0～7	Default：0	○

The parameters of this group are valid only for V/F control. （P00. 00＝0）

0：Linear V/F

It is applicable to common constant torque load.

1： Multi-point V/F

It is applicable to special load such as dehydrator and centrifuge. Four V/F curves can be obtained by setting parameters of P04. 02 to P04. 09.

2： 1. 2 –power V/F

3： 1. 4–power V/F

4： 1. 6–power V/F

5： 1. 8–power V/F

6： 2. 0–power V/F

It is applicable to low load applications fan or pump.

7：V/F separation

In this mode, the output frequency and output voltage of the inverter are independent. Set the frequency with the other same curve and output voltage is set by the method selected in P04.20. It is applicable to variable frequency power supply and torque motor control.

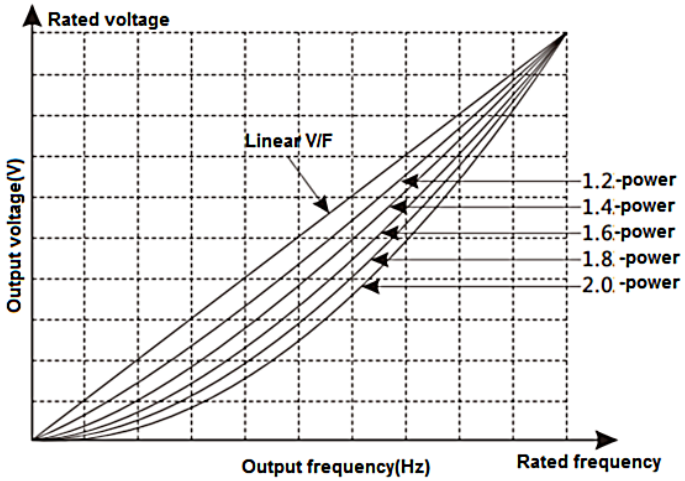


Figure 6-9 V/F curve diagram

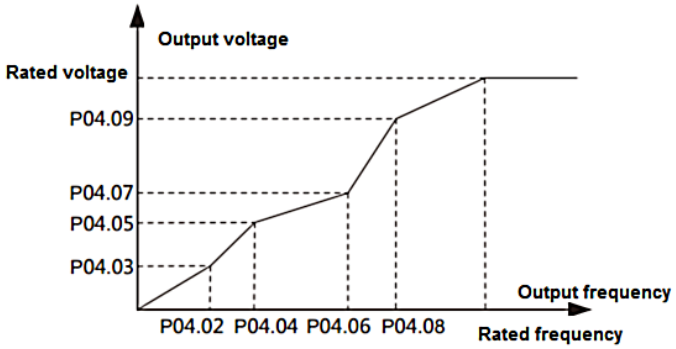


Figure 6-10 Multi-point V/F diagram

P04.01	Reserved	Parameters reserved	Default：0	○

P04.02	Multi-point V/F frequency 1	Range：0.00Hz～P04.04	Default：5.00Hz	◎
P04.03	Multi-point V/F voltage 1	Range：0.0～100.0%	Default：10.0%	◎
P04.04	Multi-point V/F frequency 2	Range：P04.02～P04.06	Default：10.00Hz	◎
P04.05	Multi-point V/F voltage 2	Range：0.0～100.0%	Default：20.0%	◎

P04.06	Multi-point V/F frequency 3	Range：P04.04～P04.08	Default：20.00Hz	◎
P04.07	Multi-point V/F voltage 3	Range：0.0～100.0%	Default：40. 0%	◎
P04.08	Multi-point V/F frequency 4	Range：P04.06～P00.08	Default：40.00Hz	◎
P04.09	Multi-point V/F voltage4	Range：0.0～100.0%	Default：80.0%	◎

P04. 02～P04. 09 parameters used to define the multi-point V/F curve. When the output frequency is 0Hz, the output voltage of inverter is 0. When the output frequency is the rated frequency of the motor, the output voltage is the rated voltage of the motor. Four different V/F curves can be set by P04. 02～P04. 09. And take the rated voltage of the motor as the voltage reference. The multi-point V/F curve is set based on the motor's load characteristic. Improper setting may cause large current and burn out of the motor.

The parameter setting of P04. 02～P04. 09 should satisfy the following conditions:

0≤F1≤F2≤F3≤F4≤Max. frequency；0≤V1≤V2≤V3≤V4≤100. 0%

P04.10	Auto torque boost compensation	Range：0～2000	Default：0.0s	○
P04.11	V/F manual torque boost	Range：0.0～30.0%	Default：0.0%	○
P04.12	Reserved			

The V/F curve after torque boost are shown below and the torque boost can help improve the low frequency torque characteristics of V/F control.

Select proper torque according to the load. If the load is large and the motor startup torque is insufficient, increase the value of P04.11. But If the torque boost is set to too large, the motor may overheat, and the inverter may suffer overcurrent. When it is set to 0.0%, the inverter performs automatic torque boost. And the automatic torque boost is factory setting.

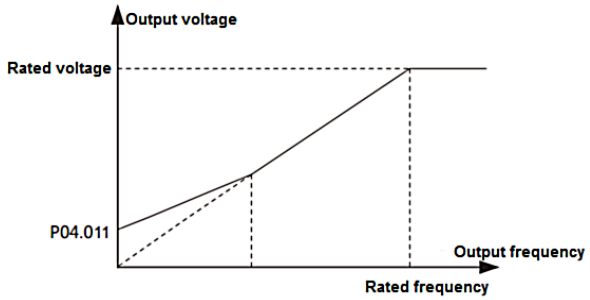


Figure 6-11 Manual torque boost

P04.13	Field weakening torque commpensation coefficient	Range: 0~2500	Default: 0	○
P04.14	Reserved			
P04.15	Slip compensation gain	Range：0.0～250.0%	Default：100.0%	○
P04.16	Reserved			

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case of load change. This parameter corresponds to the rated slip of motor.

P04.17	Oscillation suppression gain	Range：0.0～30.0	Model dependent	○
P04.18	Reserved			

The speed change and current oscillation may easily occur by the load when the motor operates in V/F control mode, and severely, the system cannot operate normally and overcurrent protection occur, especially in applications of no load or light load. Adjust the parameter to suppress the oscillation of motor speed and current. Generally, it is not necessary to change it, if necessary, gradually improve it based on the factory default. Do not set the value too large, otherwise, it may affect the V/F control performance.

P04.19	Flux braking	Range：0～1	Default：1	○

0：Disable

1：Enable

The flux braking is valid when decelerates to stop. By increasing the magnetic flux of motor, the electric energy will be converted into heat energy in deceleration, which can help realize the purpose of rapid deceleration. When selecting this parameter, the deceleration time will be shorter but current will be larger. If selecting to 0, the current in deceleration will be smaller but deceleration time will be longer.

P04.20	Voltage source for V/F separation	Range：0～6	Default：0	◎

0：Digital setting（P04. 21）

The output voltage of inverter is set directly in P04. 21.

1：AI 1

2：AI 2

3：AI 3

The output voltage is set by analog input terminals. For details, refer to Group P05 parameters.

4：PULSE-I N

The output voltage is set by high-speed pulse input terminals. For details, refer to Group P05 parameters

5：PI D control

The output voltage is generated based on PID closed loop. For details, refer to Group P08 parameters.

6：MODBUS communication setting

The output voltage is set by the host computer by means of communication

Notes： 100.0% of the setting in each mode corresponds to the rated motor voltage

P04.21	Voltage digital setting for V/F separation	Range：0.0～100.0%	Default：0.0%	○

When P04. 20 is set to 0, the output voltage is set directly in this parameter.

P04.22	Voltage rise time of V/F separation	Range：0.0～2000.0s	Default：0.0s	○
P04.23	Voltage decline time of V/F separation	Range：0.0～2000.0s	Default：0.0s	○

P04.22 indicates the time required for the output voltage to rise from 0 V to the rated motor voltage. P04.23 indicates the time required for the output voltage to decline from the rated motor voltage to 0 V.

P04.24	Voltage lower limit of V/F separation	Range：0.0%～P04.25	Default：0.0%	○
P04.25	Voltage upper limit of V/F separation	Range：P04.24～100.0%	Default：100.0%	○

The voltage upper limit and lower limit of V/F separation are used to limit the range of voltage output during running, so that the output voltage changes in a certain area.

P04.26	Current limit	Range：20. 0%～200. 0%	Default：160.0%	○
P04.27	Current limit switch	Range: 0~1	Default: 0	○
P04.28	VF torque filter coefficient	Range: 0~100	Default: 10	○

Current limit is used to adjust output frequency to control the output current within this limit value when the output current increase rapidly because of sharp change in load. The output frequency restores after load decrease. For the applications where the set speed or load changes sharply, use this parameter to decrease the overcurrent faults. When current limit is valid, the output frequency at constant speed may change instantaneously and the acceleration/ deceleration time may be longer. But this function is not suitable for the applications where output frequency or acceleration/ deceleration time are not allowed to change.

100% of this setting corresponds to the rated current of inverter. If the setting value is too large, the probability of overcurrent fault may increase; if too small, the load capability of inverter may influenced. Therefore, set this value in accordance with the actual load.

6. 6 P05 input terminal parameters

P05.00	DI1(Digital input) function selection	Range：0～63	Default：1	◎
P05.01	DI2(Digital input) function selection	Range：0～63	Default：2	◎
P05.02	DI3(Digital input) function selection	Range：0～63	Default：4	◎
P05.03	DI4(Digital input) function selection	Range：0～63	Default：6	◎
P05.04	DI5(Digital input) function selection	Range：0～63	Default：8	◎
P05.05	DI6(Digital input) function selection	Range：0～63	Default：9	◎
P05.06	HDI1 function selection	Range：0～63	Default：33	◎

The following table lists the functions available for the DI terminals.

Value	Function	Value	Function
0	No function	25	External STOP
1	Forward RUN (FWD)	26	Emergency stop
2	Reverse RUN (REV)	27	PLC status reset
3	Three-line control	28	PLC RUN pause
4	Forward JOG (FJOG)	29	Counter input
5	Reverse JOG (RJOG)	30	Counter reset
6	Coast to stop	31	Length count input
7	RUN pause	32	Length reset
8	Fault reset (RESET)	33	High-speed pulse input（only for HDI）
9	External fault input	34	Swing pause（Pause at the current frequency）
10	Frequency setting UP	35	Swing reset（Return to center frequency）
11	Frequency setting DOWN	36	Acceleration/Deceleration prohibited
12	Frequency UP/DOWN setting clear	37	Run prohibited
13	Frequency UP/DOWN setting temporary clear	38	Speed control/Torque control switchover
14	Multi-reference terminal 1	39	Torque control prohibited
15	Multi-reference terminal 2	40	Command source switchover terminal
16	Multi-reference terminal 3	41	Switch running commands to operation panel
17	Multi-reference terminal 4	42	Switch running commands to terminal
18	Terminal 1 for acceleration/ deceleration time selection	43	Switch running commands to communication
19	Terminal 2 for acceleration/ deceleration time selection	44	Motor selection
20	PID pause	45	Clear the current running time
21	Reverse PID action direction	46～63	Reserved
22	PID parameter switchover		
23	Immediate DC braking		
24	Deceleration DC braking		

0：No function

No operation for inverter even if signal input. Set 0 for reserved terminals to avoid malfunction.

1：Forward RUN

2：Reverse RUN

The terminal is used to control forward or reverse RUN of the inverter. For the operation selection at first power-on, refer to the description of P01. 21.

3：Three-line control

The terminal determines three-line control of the inverter. For details, see the description of P05. 11.

4： Forward JOG

5： Reverse JOG

The terminal is used to control forward or reverse JOG of the inverter. During operation, refer to P 01 .1 0, P01. 11 and P01. 12 for the JOG frequency, acceleration/ deceleration time. For the operation selection at first power-on, refer to the description of P01. 21.

6：Coast to stop

The inverter blocks its output, the motor coasts to rest and is not controlled by the inverter. This method is usually taken for the load with large inertia and no any special requirements for stop. It is the same as coast to stop described in P01. 05.

7：RUN pause

When the “RUN pause” is valid, the inverter blocks the output and frequency becomes 0.. After this function is disabled, the inverter resumes its operation.

8： Fault reset

The terminal is used for fault reset function, the same as the function of STOP/RESET key on the operation panel. Remote fault reset is implemented by this function.

9： External fault input

If this terminal becomes ON, error occurs and the inverter stop.

10： Frequency setting UP

11： Frequency setting DOWN

The increment and decrement of frequency is determined by external terminals. The set frequency can be adjusted by P00. 29 and P00. 30 when frequency source A is set to “Digital setting + UP/DOWN”. The function of save and integral upon power-failure is decided by P00. 28.

12：Frequency UP/DOWN setting clear

If the frequency source is digital setting, the terminalis used to clear the modification by using the UP/DOWN function or the turn button on the operation panel, returning the set frequency to the initial value of P00. 12.

13： Frequency UP/DOWN setting temporary clear

If the frequency source is digital setting, the terminalis used to clear the modification temporarily by using the UP/DOWN function or the turn button on the operation panel, returning the set frequency to the initial value of P00. 12. But when this terminal is invalid, the set frequency resumes to the value of P00. 12+UP/DOWN or turn button on the operation panel and has the superposition.

14：Multi-reference terminal 1

15：Multi-reference terminal 2

16：Multi-reference terminal 3

17：Multi-reference terminal 4

The four multi-reference terminals have 16 state combinations, corresponding to 16 reference values, as listed in the following table. Besides the multi-speed function, the multi-reference can be also used as the PID setting source, satisfying the requirement on switchover of different setting values.

If the frequency source is multi-reference, the value 100% of P11. 01~P11. 16 corresponds to max. output frequency P00. 08.

If the frequency source is PID setting source, the value 100% of P11. 01~P11. 16 corresponds to 100% PID feedback scale, that is full scale of feedback meter.

Terminal 4	Terminal 3	Terminal 2	Terminal 1	Reference Setting	Corresponding Parameter
OFF	OFF	OFF	OFF	Reference 0	P11.01
OFF	OFF	OFF	ON	Reference 1	P11.02
OFF	OFF	ON	OFF	Reference 2	P11.03
OFF	OFF	ON	ON	Reference 3	P11.04
OFF	ON	OFF	OFF	Reference 4	P11.05
OFF	ON	OFF	ON	Reference 5	P11.06
OFF	ON	ON	OFF	Reference 6	P11.07
OFF	ON	ON	ON	Reference 7	P11.08
ON	OFF	OFF	OFF	Reference 8	P11.09
ON	OFF	OFF	ON	Reference 9	P11.10
ON	OFF	ON	OFF	Reference 10	P11.11
ON	OFF	ON	ON	Reference 11	P11.12
ON	ON	OFF	OFF	Reference 12	P11.13
ON	ON	OFF	ON	Reference 13	P11.14
ON	ON	ON	OFF	Reference 14	P11.15
ON	ON	ON	ON	Reference 15	P11.16

18：Terminal 1 for acceleration/deceleration time selection

19：Terminal 2 for acceleration/deceleration time selection

Two terminals for acceleration/deceleration time selection have four state combinations, as listed in the following table.

Terminal 2	Terminal 1	Acceleration/Deceleration Time Selection	Corresponding parameter
OFF	OFF	Acceleration/Deceleration time 0	P00.13, P00.14
OFF	ON	Acceleration/Deceleration time 1	P00.15, P00.16
ON	OFF	Acceleration/Deceleration time 2	P00.17, P00.18
ON	ON	Acceleration/Deceleration time 3	P00.19, P00.20

20：PID pause

PID is invalid temporarily. The inverter maintains the current frequency output without supporting PID adjustment of frequency source.

21：Reverse PID action direction

After this terminal becomes ON, the PID action direction is reversed to the direction set in P08. 03.

22：PID parameter switchover

The PID parameters switchover is performed when P08. 11 is set to 1. The parameters are decided by P8. 05 to P8. 07 when this terminal becomes OFF; the PID parameters are decided by P8. 08 to P8. 10 when this terminal becomes ON.

23：Immediate DC braking

After this terminal becomes ON, the inverter directly switches over to the DC braking state.

24： Deceleration DC braking

When this terminal becomes ON, the inverter decelerates to the initial frequency of stop DC braking and then switches over to DC braking state.

25： External STOP

In any control mode, it can be used to make the inverter stop, and the stop mode is decided by P01. 05.

26：Emergency stop

When this terminal becomes ON, the inverter will stop according to the deceleration time set in P01. 13. So please set

appropriate deceleration time to stop the inverter in emergency state.

27：PLC status reset

The terminal is used to restore the original status of PLC control for the inverter when PLC control is started again after a pause.

28：PLC run stop

In simple PLC operation, when this terminal becomes ON, the PLC operation time and PLC stage will be memorized and inverter output frequency 0 Hz. After this function is disabled, the inverter resumes its operation.

29：Counter input

This terminal is used to count pulses which should be less than 200Hz. Otherwise, it may cause the accuracy of counting. For details, refer to the description of P09. 13 and P09. 14.

30：Counter reset

This terminal is used to clear the counter status.

31：Length count input

This terminal is used to count the length. For details, refer to the description of P09. 10 and P09. 11.

Notes: When the length count pulse frequency is less than 200Hz, this function can be selected for DI 1 to DI 6.

32：Length reset

This terminal is used to clear the length.

33：High-speed pulse input（only for HDI）

Only available for HDI input terminal. The pulse signal the terminal received can be used as the frequency setting, PID feedback, V/F separation voltage setting. For the relationship between the pulse frequency of input signal and settings, refer to the parameter description of P05. 33 and P05. 36. Set P05. 06 to 33 to make the high-speed pulse input available.

34：Swing pause（Pause at the current frequency）

The inverter pauses at the current frequency. After this function is disabled, the inverter starts at the current frequency.

35：Swing reset（Return to center frequency）

The inverter outputs central frequency and swing frequency function is enabled.

36：Acceleration/Deceleration prohibited

It enables the inverter to maintain the current frequency output without being affected by external signals (except the STOP command).

37：Run prohibited

When this terminal becomes ON, the inverter will coast to stop. And the inverter will not receive the running signal in standby.

38：Speed control/Torque control switchover(used for vector control mode)

This terminal enables the inverter to switch over between speed control and torque control in the vector control mode.

39：Torque control prohibited

The inverter is prohibited from torque control and enters the speed control mode

40：Command source switchover terminal

When P00. 05 is set to 6 to 10 and this terminal becomes ON, the switch can be performed between the two frequency.

41：Switch running commands to operation panel

When this terminal becomes ON, the command source is set to operation panel control. When this terminal becomes OFF, it will return to the former command source.

42：Switch running commands to terminal

When this terminal becomes ON, the command source is set to terminal control. When this terminal becomes OFF, it will return to the former command source.

43：Switch running commands to communication

When this terminal becomes ON, the command source is set to communication control. When this terminal becomes OFF, it will return to the former command source.

44：Motor selection

When this terminal becomes ON, motor 1 will be switched to motor 2. Simultaneously, the motor parameters and corresponding control parameters will be switched.

45：Clear the current running time

When this terminal becomes ON, the inverter's current running time is cleared.

P05.07	DI1~DI4 Digital input Logic selection	Range：0x0000～0x1111	Default：0x0000	◎

Unit’s digit：DI 1 logic setting

0： Valid at normally closed. Valid when DI terminal is connected with COM; Invalid when DI terminal is disconnected with COM.

1： Valid at normally open. Invalid when DI terminal is connected with COM; Valid when DI terminal is disconnected with COM.

Ten’s digit：DI 2 logic setting

Same as DI 1.

Hundred’s digit：DI 3 logic setting

Same as DI 1.

Thousand’s digit：DI 4 logic setting

Same as DI 1.

P05.08	DI5～HDI1 Digital input Logic selection	Range：0x0000～0x0111	Default：0x0000	◎

The setting is same as P05. 07.

P05.09	Reserved			
P05.10	Digital input filter time	Range：0.00s～10.00s	Default：0.01s	○

Set the filter time for DI terminal. If the input terminal is easy to be disturbed and cause misoperation in some applications, this parameter can be increased to enhance the anti-interference ability, but slow down the response of DI terminal.(Invalid for HDI 1 in PULSE-IN)

P05.11	Terminal command mode	Range：0～3	Default：0	◎
P05.12	Reserved			

This parameter is used to set the four modes in which the inverter is controlled by external terminals.

0：Two-line mode 1

It is the most commonly used two-line mode, in which the forward/reverse rotation of the motor is decided by DIx and DIy. The parameters are set as below:

Terminal	Value	Description
DIx	1	Forward RUN（FWD）
DIy	2	Reverse RUN（REV）

When DI x and DI y are the multifunctional digital input terminal for DI 1~DI 6 and HDI 1, the level is valid.

K1	K2	RUN command
0	0	Stop
1	0	Forward RUN
0	1	Stop
1	1	Reverse RUN

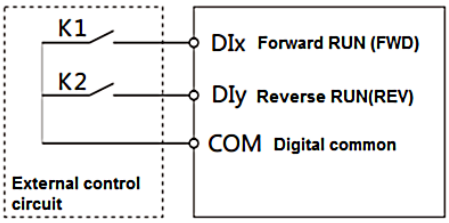


Figure 6-12 Two-line mode 1

1: Two-line mode 2

In this mode, DIx is RUN enabled terminal, and DIy determines the running direction.

The parameters are set as below:

Terminal	Value	Description
DIx	1	RUN enabled
Diy	2	Forward or reverse direction（FWD/ REV）

When DI x and DI y are the multifunctional digital input terminal for DI 1~DI 6 and HDI 1, the level is valid.

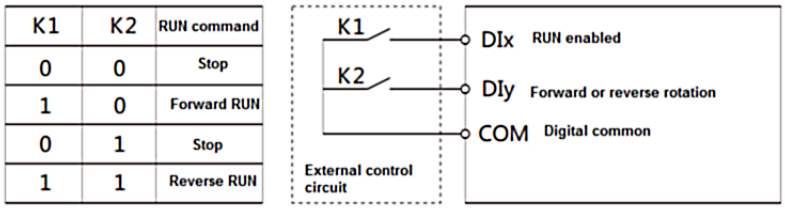


Figure 6-13 Two-line mode 2

2: Three-line mode 1

In this mode, DI n is RUN enabled terminal, and the direction is decided by DI x and DI y.

The parameters are set as below:

Terminal	Value	Description
DIx	1	Forward RUN (FWD)
DIy	2	Reverse RUN (REV)
DIn	3	Three-line control1

①When RUN is required, close DI n terminal and the forward/reverse RUN is controlled by DI x/DI y pulse rising edge.

②When STOP is required, disconnect DI n terminal.

③When DI x , DI y and DI n are the multifunctional digital input terminal for DI 1~DI 6 and HDI 1, DI x and DI y rising edge and DIn level is valid.

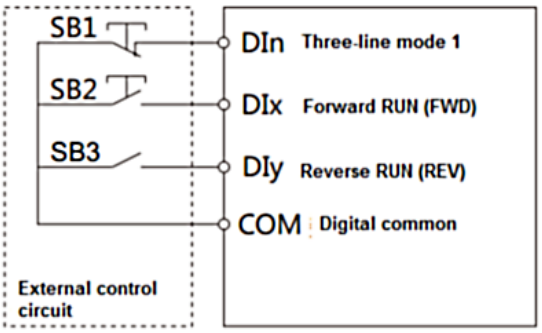


Figure 6-14　Three-line mode 1

④SB1：Stop , SB2：Forward RUN, SB3：Reverse RUN

3: Three-line mode 2

In this mode, DI n is RUN enabled terminal. The RUN command is given by DI x and the direction is decided by DI y. The parameters are set as below:

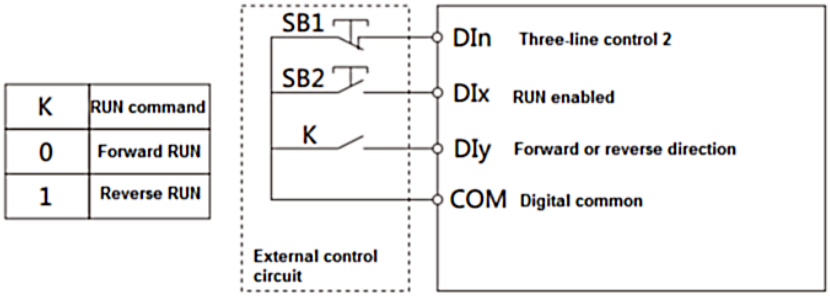
Terminal	Value	Description
DIx	1	RUN enabled
DIy	2	Forward or reverse direction
DIn	3	Three-line control 2

①When RUN is required, close DI n terminal. The motor RUN signal is decided by DI x pulse rising edge and the direction

signal is decided by DIy state.

②When STOP is required, disconnect DI n terminal.

③When DI x , DI y and DI n are the multifunctional digital input terminal for DI 1~DI 6 and HDI 1, DI x and DI y rising edge and DIn level is valid.



④SB1：Stop, SB2：RUN, K：Switchover of forward/ reverse RUN

P05.13	AI1 voltage lower limit	Range：0.00V～P05.15	Default：0.00V	○
P05.14	AI1 lower limit setting	Range：-100.0%～100.0%	Default：0.0%	○
P05.15	AI1 voltage upper limit	Range：P05.13～10.00V	Default：10.00V	○
P05.16	AI1 upper limit setting	Range：-100.0%～100.0%	Default：100.0%	○
P05.17	AI1 input filter time	Range：0.00s～10.00s	Default：0.10s	○

These parameters are used to define the relationship between the analog input voltage and the corresponding setting. When the analog input voltage exceeds the upper limit value, the upper limit value is used. When the analog input voltage is less than the lower limit value, the lower limit value is used.

P05.17 is used to set the software filter time. If the analog input is liable to interference, increase the value of this parameter to stabilize the detected analog input. However, increase of the AI filter time will slow the response of analog detection. Set this parameter properly based on actual conditions.

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

Two typical setting examples are shown in the following figure.

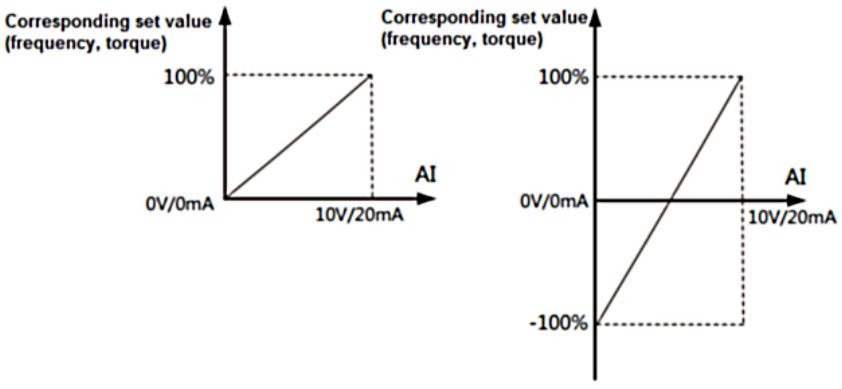


Figure 6-16 Relationship between the analog input voltage and the corresponding setting

P05.18	AI2 input selection	Range：0～1	Default：0	○

0：Voltage input

1：Current input

Notes: Select according to the actual input voltage or current of AI2 terminal. If improper value is selected, P26. 14 will display improper value.

P05.19	AI2 voltage lower limit	Range：0.00V～P05.21	Default：0.00V	○
P05.20	AI2 lower limit setting	Range：-100.0%～100.0%	Default：0.0%	○
P05.21	AI2 voltage upper limit	Range：P05.19～10.00V	Default：10.00V	○
P05.22	AI2 upper limit setting	Range：-100.0%～100.0%	Default：100.0%	○
P05.23	AI2 input filter time	Range：0.00s～10.00s	Default：0.10s	○
P05.24	AI2 current lower limit	Range：0.00mA～P05.26	Default：0.00mA	○
P05.25	AI2 lower limit setting	Range：-100.0%～100.0%	Default：0.0%	○
P05.26	AI2 current upper limit	Range：P05.24～20.00mA	Default：20.00mA	○
P05.27	AI2 upper limit setting	Range：-100.0%～100.0%	Default：100.0%	○

For the function and usage of AI2, please refer to the description of AI 1. When the analog input is current input, 1mA current corresponds to 0.5 V voltage; 20mA current corresponds to 10V voltage, as shown in figure 6-16.

P05.28	AI3 voltage lower limit	Range：0.00V～P05.30	Default：0.00V	○
P05.29	AI3 lower limit setting	Range：-100.0%～100.0%	Default：0.0%	○
P05.30	AI3 voltage upper limit	Range：P05.28～10.00V	Default：10.00V	○
P05.31	AI3 upper limit setting	Range：-100.0%～100.0%	Default：100.0%	○
P05.32	AI3 input filter time	Range：0.00s～10.00s	Default：0.10s	○

For the function and usage of AI3, please refer to the description of AI 1. The difference is that the voltage input for AI 3 is -10. 00V to +10. 00V.

P05.33	High-speed pulse input minimum frequency	Range：0.00kHz～P05.35	Default：0.00kHz	○
P05.34	High-speed pulse input minimum frequency	Range：-100.0%～100.0%	Default：0.0%	○
P05.35	High-speed pulse input maximum frequency	Range：P05. 33～100. 00kHz	Default：50.00kHz	○
P05.36	High-speed pulse input maximum frequency	Range：-100.0%～100.0%	Default：100.0%	○
P05.37	High-speed pulse input filter time	Range：0.00s～10.00s	Default：0. 1s	○

This group of function codes is used to set the relationship between HDI1 pulse frequency and corresponding setting. The pulse frequency can only be input into inverter by HDI1. The usage of this group is similar to AI1. For details, refer to AI1 description.

6. 7 P06 output terminal parameter group

P06.00	HDO1 output mode selection	Rane：0～1	Default：0	○

0：Digital output（switching ）

1：PULSE-OUT

HDO1 can be used as the high-speed pulse output terminal (HDO1), and also can be used as switching output terminal of open collector(DO).

P06.01	Reserved			
P06.02	Digital output logic selection	Range：0x0000～0x0111	Default：0x0000	○

It is used to set the output logic of digital output.

Unit’s digit：DO1 setting

0：Valid at normally closed. The terminal is valid when digital output terminal is connected to the corresponding common terminal. The terminal is invalid when digital output terminal is disconnected to the corresponding common terminal;

1：Valid at normally open. The terminal is invalid when digital output terminal is connected to the corresponding common terminal. The terminal is valid when digital output terminal is disconnected to the corresponding common terminal

Ten’s digit：Relay T1 setting

Same as Unit’s digit.

Hundred’s digit：HDO1 setting

Same as Unit’s digit.

Hundred’s digit：Reserved

P06.03	DO1 digital output function selection	Range：0~40	Default：0	○
P06.04	Relay T1 digital output function selection	Range：0~40	Default：0	○
P06.05	HDO1 digital output function selection	Range：0~40	Default：0	○

Functions of output terminals:

Value	Function	Description
0	No output	The terminal has no function.
1	Ready for RUN	If the inverter main circuit and control circuit become stable, and the inverter detects no fault and is ready for RUN, the terminal becomes ON.
2	Inverter running	When the inverter is running and has output frequency (can be zero), the terminal becomes ON.
3	Inverter forward rotation	When the inverter is in forward rotation and has output frequency, the terminal becomes ON.
4	Inverter reverse rotation	When the inverter is in reverse rotation and has output frequency, the terminal becomes ON
5	Zero-speed running 1 (no output at stop)	If the inverter runs with the output frequency of 0, the terminal becomes ON. If the inverter is in the stop state, the terminal becomes OFF.
6	Zero-speed running 2 （output at stop）	If the output frequency of the inverter is 0, the terminal becomes ON. In the state of stop, the signal is still ON
7	Fault output	When the inverter stops due to a fault, the terminal becomes ON
8	Overload pre-warning	When the inverter and motor exceeds the overload pre-warning threshold before performing the protection action, If the pre-warning threshold is exceeded, the terminal becomes ON. For motor overload parameters, see the descriptions of P13. 01 to P13. 03.
9	Lightload pre-warning	When the inverter and motor exceeds the lightload threshold or has no load, the terminal becomes ON. For motor lightload parameters, see the descriptions of P13.05 to P13.07.
10	Undervoltage state output	If the inverter is in undervoltage state, the terminal becomes ON.
11	Reserved	
12	Inverter overheat warning	If the inverter temperature reaches the overheat warning threshold the terminal becomes ON.
13	PLC stage complete	When simple PLC completes one stage, the terminal outputs a pulse signal with width of 250 ms
14	PLC cycle complete	When simple PLC completes one cycle, the terminal outputs a pulse signal with width of 250 ms
15	Frequency limited	If the set frequency exceeds the frequency upper limit or lower limit and the output frequency of the inverter reaches the upper limit or lower limit, the terminal becomes ON.

16	Torque limited (in speed control)	In speed control mode, if the output torque reaches the torque limit, the terminal becomes ON.
17	Speed limited (in torque control)	In the toque control mode, if the motor speed reaches the speed limit, the terminal becomes ON.
18	Frequency upper limit reached	If the running frequency reaches the upper limit, the terminal becomes ON.
19	Frequency lower limit reached	If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the terminal becomes OFF
20	Frequency limit reached	If the running frequency is within the detection range, the terminal becomes ON. For details, refer to description of function code P09.04.
21	Frequency level detection FDT1 output	Refer to the descriptions of P09.00 and P09.01.
22	Frequency level detection FDT2 output	Refer to the descriptions of P09.02 and P09.03.
23	Arbitrary frequency reached	Refer to the descriptions of P09.21 and P09.22.
24	PID feedback loss	Refer to the description of P08. 16 and P08. 17.
25	Set count value reached	The terminal becomes ON when the count value reaches the value set in P09.13. For the counting function, refer to Group P09 parameters.
26	Designated count value reached	The terminal becomes ON when the count value reaches the value set in P09.14. For the counting function, refer to Group P09 parameters.
27	Length reached	The terminal becomes ON when the detected actual length exceeds the value set in P09. 10.
28	PID feedback overlimit	Refer to the description of P08. 18 and P08. 19.
29	Current running time reached	If the current running time of inverter exceeds the value of P09. 18, the terminal becomes ON
30	Current power-on time reached	If the current power-on time of inverter exceeds the value of P09. 19, the terminal becomes ON
31	Accumulative running time reached	If the accumulative running time of the inverter exceeds the time set in P09. 16, the terminal becomes ON.
32	Accumulative power-on time reached	If the inverter accumulative power-on time exceeds the value set in P09. 17, the terminal becomes ON
33	Communication	Refer to the communication protocol. Communication setting DO1，HDO1, T1 output
34	Fault output2	The terminal becomes ON when error occurs to the inverter and not reset(including undervoltage error and the inverter in undervoltage state)
34~40	Reserved	

P06.06	Reserved			
P06.07	DO1 digital output delay ON	Range：0.0s～6000.0s	Default：0.0s	○
P06.08	DO1 digital output delay OFF	Range：0.0s～6000.0s	Default：0.0s	○
P06.09	Relay T1 output delay ON	Range：0.0s～6000.0s	Default：0.0s	○

P06.10	Relay T1 output delay OFF	Range：0.0s～6000.0s	Default：0.0s	○
P06.11	HDO1 digital output delay ON	Range：0.0s～6000.0s	Default：0.0s	○
P06.12	HDO1 digital output delay OFF	Range：0.0s～6000.0s	Default：0.0s	○

These parameters are used to set the delay time of output terminals DO1, HDO1 and relay T1 from status change to actual output. But the output status time before delay must be larger than the set delay time. Otherwise, the actual output cannot reach the expected results.

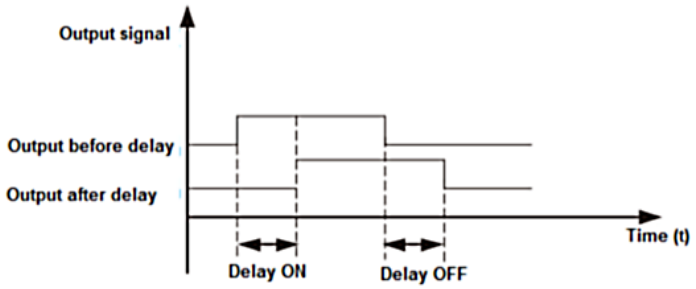


Figure 6-17 DO signal output timing

P06.13	Reserved			
P06.14	AO1 function selection	Range：0~15	Default：0	○
P06.15	AO2 function selection	Range：0~15	Default：1	○
P06.16	HDO1 pulse output function selection	Range：0~15	Default：2	○

The analog output range for AO1 and AO2 is 0 V to 1 0 V. The HDO1 output pulse frequency range is 0. 01kHz~100. 00kHz. The relationship between pulse and analog output ranges and corresponding functions is listed in the following table.

Value	Function	Range (Corresponding to pulse or analog output range 0.0%–100.0%)
0	Running frequency	0 to maximum output frequency
1	Set frequency	0 to maximum output frequency
2	Output current	0 to 2 times of rated motor current
3	Output voltage	0 to 1.2 times of rated inverter voltage
4	Output torque	0 to 2 times of rated motor torque
5	Output power	0 to 2 times of rated power
6	Pulse input	0. 01kHz~100. 00kHz
7	ABS（AI1）	0. 00V~10. 00V
8	ABS（AI2）	0. 00V~10. 00V（or 0. 00mA~20. 00mA）
9	ABS (AI3)	-10. 00V～10. 00V
10	Length	0 to maximum set length
11	Count value	0 to maximum count value
12	Motor rotational speed	0 to rotational speed corresponding to maximum output frequency
13	Output current (absolute value)	0. 0A~1000. 0A
14	Output voltage (absolute value)	0. 0V~1000. 0V
15	Communication setting percentage	0~100. 0%. For details, refer to communication protocol.

P06.17	AO1output voltage lower limit	Range：0.00V~P06.19	Default：0.00V	○
P06.18	AO1 output voltage lower limit setting	Range：0.0%~100.0%	Default：0.0%	○
P06.19	AO1 output voltage upper limit	Range：P06.17~10.00V	Default：10.00V	○

P06.20	AO1 output voltage upper limit setting	Range：0.0%~100.0%	Default：100.0%	○
P06.21	AO2 output voltage lower limit	Range：0.00V~P06.23	Default：0.00V	○
P06.22	AO2 output voltage lower limit setting	Range：00.0%~100.0%	Default：0.0%	○
P06.23	AO2 output voltage upper limit	Range：P06.21~10.00V	Default：10.00V	○
P06.24	AO2 output voltage upper limit setting	Range：0.0%~100.0%	Default：100.0%	○

These parameters are used to set the analog output voltage and the corresponding setting value.

P06.25	HDO1 mini. output setting frequency	Range：0.01KHZ~100.00KHZ	Default：0.01KHZ	○
P06.26	HDO1 mini. output setting value	Range：0.0%~HDO1max. output value	Default：0%	○
P06.27	HDO1 max. output setting frequency	Range：0.01KHZ~100.00KHZ	Default：50.00KHZ	○
P06.28	HDO1 max. output setting value	Range：HDO1mini. output value~+100.0%	Default：100%	○

6. 8 P08 process control PID parameters

PID control is a general process control method. By performing proportional, integral and differential operations on the difference between the feedback signal and the target signal, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled counter around the target value.

It is applied to process control such as flow control, pressure control and temperature control.

Proportional（P）

Proportional to the deviation.

Integral（I）

Proportional to the integral of deviation.

Differential（D）

Proportional to the change ratio of deviation and it can predict the change trend of deviation, quickly respond to drastic changes, and improve the dynamic performance. But please use it carefully as the interference is easily caused and the system will become unstable.

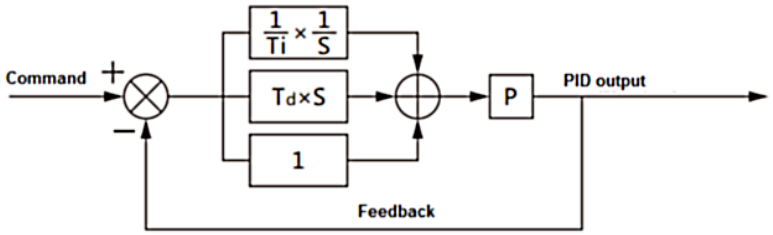


Figure 6-18 Principle block diagram of PID control

P08.00	PID setting source	Range：0~6	Default：0	○

0：Set in P08. 01

1：AI 1

2：AI 2

3：AI 3

4：PULSE-I N

5：Multi-reference

6：MODBUS communication setting

P08. 00 is used to select the channel of target process PID setting. The PID setting is a relative value and ranges from 0.0% to 100.0%. The PID feedback is also a relative value. The purpose of PID control is to make the PID setting and PID

feedback equal.

Notes: When PID control is selected for command source(E.g.P00. 03 or P00. 04 is set to 9 or 8), process PID control becomes valid.

P08.01	PID digital setting	Range：0.0%~100.0%	Default：50.0%	○

When P08.01 is selected, the command value of PID control is the setting value of this parameter.

P08.02	PID feedback source	Range：0~8	Default：0	○

0：AI 1

1：AI 2

2：AI 3

3：PULSE-I N

4：AI 1-AI 2

5：AI 1+AI 2

6：MAX(AI 1，AI 2)

7：MI N (AI 1，AI 2)

8：MODBUS communication setting

This parameter is used to select the feedback signal channel. The feedback input channel must be externally input and cannot be the same channel as the PI D set channel, otherwise, the PID control will become invalid.

P08.03	PID action direction	Range：0~1	Default：0	○

0：Forward action（Negative feedback）

When the feedback value is smaller than the PID setting, the Inverter's output frequency rises.

1：Reverse action（Positive feedback）

When the feedback value is smaller than the PID setting, the Inverter's output frequency reduces.

Note that this function is influenced by the DI function "Reverse PID action direction".

P08.04	PID setting feedback range	Range：0.0~6553.5	Default：100.0	○

This parameter is the user-defined unit. PID setting feedback range refers to the physical value 100% corresponding to PID setting value(feedback full scale). If the pressure full scale in constant pressure water supply is 30. 0MPa, P08.04 is set to 30.0. At this time, the unit of status display function codes PID setting P26.08 and PID feedback P26.09 0. 1MPa.

P08.05	PID proportional gain 1	Range：0.0~100.0	Default：20.0	○
P08.06	PID integral time 1	Range：0.01s~10.00s	Default：2.00s	○
P08.07	PID differential time 1	Range：0.000s~10.000s	Default：0.000s	○
P08.08	PID proportional gain 2	Range：0.0~100.0	Default：20.0	○
P08.09	PID integral time 2	Range：0.01s~10.00s	Default：2.00s	○
P08.10	PID differential time 2	Range：0.000s~10.000s	Default：0.000s	○

To satisfy the more complicated occasions of process PID control, E-series inverter has two groups of PID control parameters.

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

Integral time（Ti)：It decides the integral regulating intensity. The shorter the integral time is, the largerthe regulating intensity is. When the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time set in P00. 08. Then the adjustment amplitude reaches the maximum frequency.

Differential time（Td)：It decides the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is. Differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency.

P08.11	PID parameter switchover condition	Range：0~2	Default：0	○
P08.12	PID parameter switchover deviation	Range：0.0%~100.0%	Default：20.0%	○

0：No switchover

PID parameters are decided by P08. 05 to P08. 07.

1：Switchover via DI

When DI terminal is valid, the PID parameters are decided by P08. 08 to P08. 10.

2：Automatic switchover based on deviation

If you select automatic switchover, when the absolute value of the deviation between PID feedback and PID setting is smaller than the value of P08. 12, group 1 is selected and which is decided by P08. 05 to P08. 07. When the absolute value of the deviation between PID feedback and PID setting is higher than the value of P08. 12, group 2 is selected and which is decided by P08. 08 to P08. 10.

P08.13	PID deviation limit	Range：0.0%~100.0%	Default：0.0%	○

If the deviation between PID feedback and PID setting is smaller than the value of P08.13, PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize,

The relationship between deviation limit and PID output is shown below:

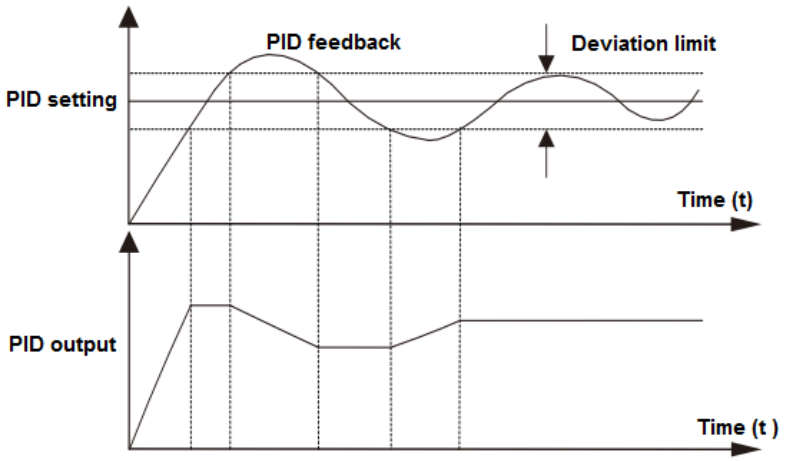


Figure 6-19 PID deviation limit

P08.14	PID preset output value	Range：0.0%~100.0%	Default：10.0%	○
P08.15	PID preset output holding time	Range：0. 0s~6000. 0s	Default：0. 0s	○

When P08. 15 is set to non-zero, PID preset mode starts. Set appropriate PID preseet output and holding time to avoid the deviation limit between feedback and setting reached at inverter starts and can suppress the rapid change of PID output and stabilize the running of the inverter.

When the PID output is the frequency command source, the PID output 100. 0% corresponds to the maximum output frequency.

When PID output is frequency commnd source, after PID runs, the frequency accelerates to PID preset frequency based on the acceleration/ deceleration time. The inverter runs continuously at this frequency point unitl cannot meet the value in P08.15 PID preset output holding time, the PID regulator output runs, which as shown below:

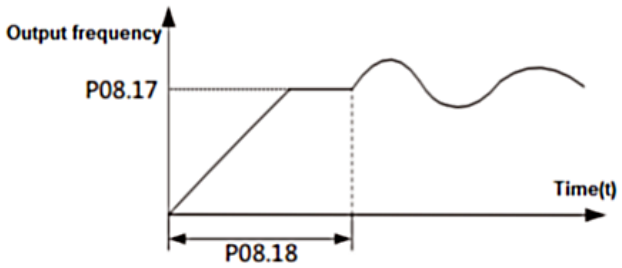


Figure 6-20 PID preset output

P08.16	Detection value of PID feedback loss	Range：0.0%~100.0%	Default：0.0%	○
P08.17	Detection time of PID feedback loss	Range：0. 0s~60. 0s	Default：1.0s	○

If the PID feedback is smaller than the value of P08.16 and the lasting time exceeds the value of P08.17, the inverter reports feedback loss Er 030 and acts according to the selected fault protection action.

P08.18	Detection value of PID feedback	Range：0.0%~100.0%	Default：100.0%	○
P08.19	Detection time of PID feedback overlimit	Range：0. 0s~60. 0s	Default：1.0s	○

If the PID feedback is smaller than the value of P08.18 and the lasting time exceeds the value of P08.19, the inverter reports feedback overlimit Er 029 and acts according to the selected fault protection action.

P08.20	PID operation at stop	Range：0~1	Default：0	○

0：No PID operation at stop

1：PID operation at stop

It is used to select whether to continue PID operation in the state of stop. Generally, the PID operation stops when the Inverter stops. The PID operation at stop may be useful in special occasions such as constant pressure water supply.

P08.21	Maximum value of PID outputs in reverse direction	Range：0.0%~100.0%	Default：0.0%	○

This function is used to limit the deviation when PID output is a negative value. User can set this parameter according to the actual conditions and the default is 0. 0%, which means PID output cannot be a negative number(reverse direction). When PID output is frequency command source, PID output 100% corresponds to the maximum output frequency.

6. 9 P09 special function parameter（FDT, swing frequency, fixed length, count and timing）

P09.00	Frequency detection value 1（FDT1）	Range：0.00Hz~P00.08	Default：50.00Hz	○
P09.01	Frequency detection hysteresis（FDT hysteresis 1)	Range：0.0%~100.0%（corresponding to FDT1）	Default：5.0%	○
P09.02	Frequency detection value 2（FDT2）	Range：0.00Hz~P00.08	Default：25. 00Hz	○
P09.03	Frequency detection hysteresis（FDT hysteresis 2)	Range：0.0%~100.0%（corresponding to FDT2）	Default：5.0%	○

If the output frequency is higher than the value of set frequency, the corresponding DO terminal becomes ON. If the output frequency is lower than value of set frequency, the DO terminal goes OFF. Up to two detection point can be set simultaneously.

FDT hysteresis range＝FDT detection value×FDT hysteresis value

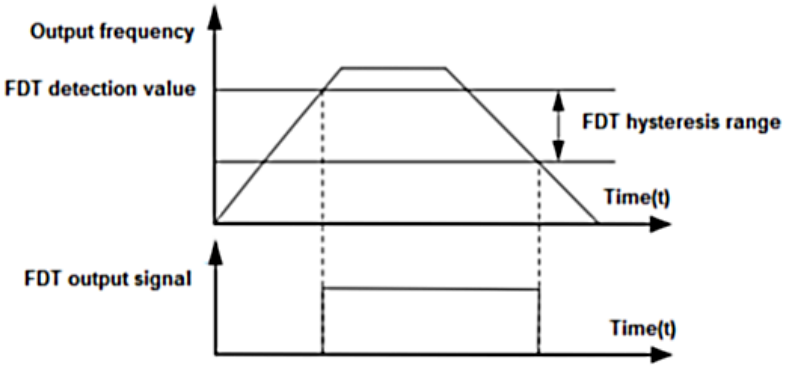


Figure 6-21 FDT signal

P09.04	Detection range of frequency reached	Range：0.00Hz~P00.08	Default：2.50Hz	○

When the inverter output frequency is within the range of set frequency - P09. 04 <= output frequency <= set frequency +P09. 04, the corresponding DO terminal becomes ON.

Notes: The value of detection range of frequency reached must be less than set frequency.

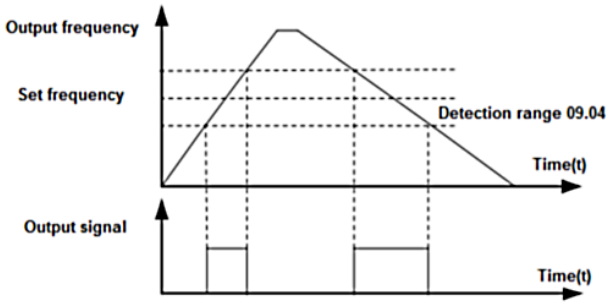


Figure 6-22 Detection range of frequency reached

P09.05	Swing frequency setting mode	Range：0~1	Default：0	○

0：Relative to the central frequency（current set frequency）

1：Relative to the maximum frequency

When swing frequency setting mode is relative to the maximum output frequency, the swing amplitude is fixed.

P09.06	Swing frequency amplitude	Range：0. 0%~100. 0%	Default：0.0%	○
P09.07	Jump frequency amplitude	Range：0.0%~50.0%	Default：0.0%	○
P09.08	Swing frequency rising time	Range：0.1s~3000.0s	Default：5.0s	○
P09.09	Swing frequency falling time	Range：0.1s~3000.0s	Default：5.0s	○

The swing frequency function indicates that the output frequency of the inverter swings up and down with the set frequency as the center. The trace of running frequency at the time axis is shown in the following figure. The swing amplitude is set in P09.06. When P09.06 is set to 0, the swing amplitude is 0 and the swing frequency does not take effect. The swing frequency function is applied to the textile and chemical fiber fields and the applications where traversing and winding functions are required.

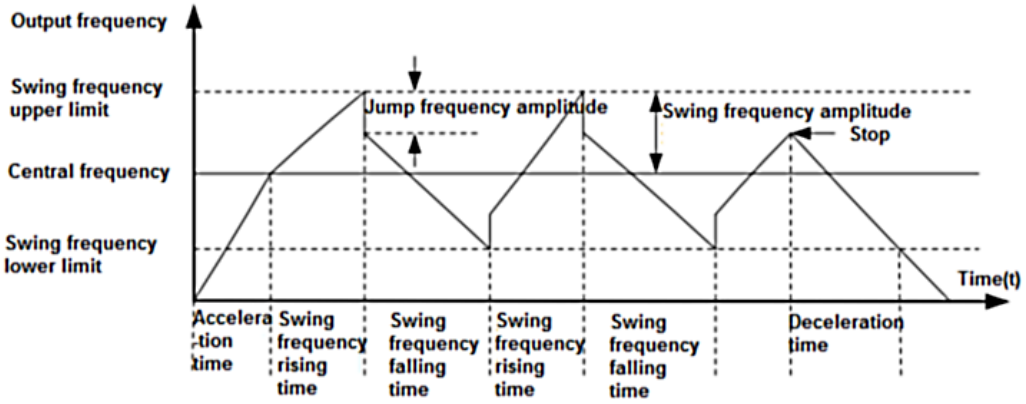


Figure 6-23 Swing frequency control

P09.06 is used to determine the swing amplitude.

0：Relative to central iirequency, It is variable swing amplitude system. The swing amplitude varies with the central frequency (set frequency)

1：Relative to the maximum frequency, it is fixed swing amplitude system. The swing amplitude is fixed.

The swing frequency is limited by the frequency upper limit and frequency lower limit.

If relative to the central frequency, the actual swing amplitude AW=Central frequency ×Swing frequency amplitude P09. 06;

If relative to the maximum frequency, the actual swing amplitude AW= Maximum frequency×Swing frequency amplitude P09. 06.

Jump frequency P09.07= Swing amplitude AW x P09. 07 Jump frequency amplitude.

Swing frequency rising time is the time that it takes to run for swing frequency from the lowest point to the highest point.

Swing frequency falling time is the tie that it takes to run for swing frequency from the highest point to the lowest point.

Swing frequency cycle specifies the time of a complete swing frequency cycle.

P09.10	Set length	Range：0~60000	Default：1000	○
P09.11	Number of pulses per meter	Range：0.1~6553.5	Default：100.0	○
P09.12	Reserved			

The preceding parameters are used for fixed length control. The length information is collected by DI terminals and set the number of pulses per meter. When the actual length exceeds the set length , the DO terminal becomes ON.

Length input DI function only supports high-speed (HDI 1) terminal receiving.

P09.13	Set count value	Range：1~60000	Default：1000	○
P09.14	Designated count value	Range：1~60000	Default：1000	○

The count value needs to be collected by DI terminal. When the count value reaches the set count value, the DO terminal becomes ON. Then the counter stops counting. When the counting value reaches the designated counting value, the DO terminal becomes ON. Then the counter continues to count until the set count value is reached.

The designated count value should be equal to or smaller than set count value.

The signal frequency of DI terminal should be less than 200Hz when counting, otherwise, it may affect the accuracy of the counting.

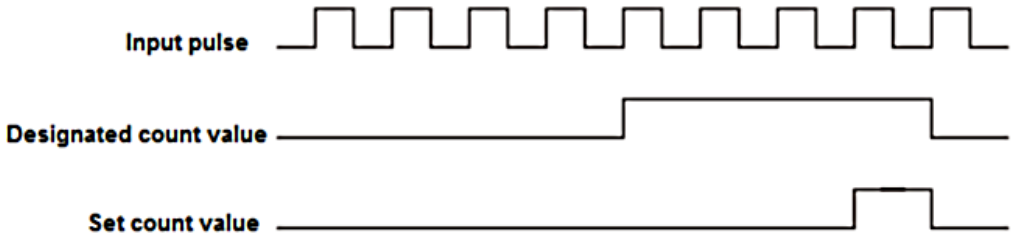


Figure 6-24 Reaching the set count value and designated count value

P09.15	Droop control	Range：0.00Hz~10.00Hz	Default：0.00Hz	○

This function is used for balancing the workload allocation when multiple motors are used to drive the same load. The output frequency of the inverters decreases as the load increases. You can reduce the workload of the motor under load by decreasing the output frequency for this motor, implementing workload balancing between multiple motors.

P09.16	Accumulative running time reached	Range：0h~60000h	Default：0h	○
P09.17	Accumulative power-on time reached	Range：0h~60000h	Default：0h	○
P09.18	Current running time reached	Range：0min~60000min	Default：0min	○
P09.19	Current power-on time reached	Range：0min~60000min	Default：0min	○

These parameters is used to set their respective reached time. When the time reached, the DO terminal becomes ON.(No.29~32)

P09.20	Action after accumulative power-on/running time	Range：0x00-0x11	Default：0x00	○

Unit’s digit： Accumulative power-on time reached

0：Only output DO

1：Output DO and fault and coast to stop

Ten’s digit：Accumulative running time reached

0：Only output DO

1：Output DO and fault and coast to stop

Hundred’s digit：Reserved

Thousand’s digit：Reserved

This parameter is used to set the signal or action after the power-on time or running time of the inverter reached.

P09.21	Frequency reached	Range：0.00HZ~max. output frequency	Default：50.00Hz	○
P09.22	Detection range of frequency	Range：0.00HZ~P09.21	Default：2.50Hz	○

When the frequency reaches the set frequency, it is regarded as the current target frequency. And this frequency is decided by P09. 21. P09. 22 is used to set the detection range.

Notes: The detection range of frequency reached should be less than the frequency reached.

6. 10 P10 operation panel and display parameters

P10.00	User password	Range：0~65535	Default：00000	○

If it is set to any non-zero number, the password protection function is enabled. After a password has been set and taken effect, you must enter the correct password in order to enter the menu. If the entered password is incorrect you cannot view or modify parameters.

If P10.00 is set to 00000, the previously set user password is cleared, and the password protection function is disabled.

P10.01	STOP/RESET key function	Range：0~1	Default：0	○

0：STOP/RESET key enabled only in operation panel

1：STOP/RESET key enabled in any operation mode

This parameter is used to set the function selection for STOP/ RESET key. When P10. 01=0, this terminal is valid in operation panel, but invalid in terminal and communication channel. When P10. 01=1, stop function in all the command source channel is valid.

Notes: No matter what value the parameter is set to be, the “RESET” function always works.

P10.02	FUN key function selection	Range：0~6	Default：1	◎

This parameter is used to set the function selection for FUN key.

0：No operation

1：Forward JOG

2：Reverse JOG

For the running frequency, JOG acceleration/ deceleration time, refer to P01. 10, P01. 11 and P01. 12.

3：Emergency stop

The inverter stops according to the deceleration time set in P01. 13. In order to stop timely, set appropriate deceleration time.

4：Coast to stop

Same as the function of P01. 05.

5：Switchover of operation command

It is valid when pressing FUN key for 2s or more. The corresponding indicator will light after switchover succeeds.

6：Clear frequency UP/DOWN setting

Clear the frequency adjusted by UP/DOWN terminal or turn button on operation panel to make the set frequency restore the initial value set in P00. 12.

P10.03	LED running display	Range：0x0000~0xFFFF	Default：0x4321	○

P10. 03 is used to set the parameter that is required to display on LED at inverter running. When multiple parameters is required to display, press >> key on the operation panel to switchover. The parameters that required to display at inverter running are shown below:

Unit’ sdigit：

0：Set frequency　4：Output current　8：PI D setting　C：DO output status

1：Running frequency　5：Output power　9：PI D feedback　D：AI1 voltage（V）

2：Bus voltage　6：Output torque　A：Rotor speed　E：AI2 voltage（V）

3：Output voltage　7：Set torque　B：DI input status　F：AI3 voltage（V）

Ten’ s digit：

Same as the setting of unit’ s digit.

Hundred’ s digit：

Same as the setting of unit’ s digit.

Thousand’ s digit：

Same as the setting of unit’ s digit.

The LED displays the factory setting value 0x4321, and the display order is running frequency, bus voltage, output voltage and output current.

P10.04	LED stop display	Range：0x0000~0xFFFF	Default：0x3210	○

P10. 04 is used to set the parameter that is required to display on LED at inverter stop. When multiple parameters is required to display, press >> key on the operation panel to switchover. The parameters that required to display at inverter stop are shown below:

Unit’ sdigit：

0：Set frequency　　4：AI 3 input voltage　　8：Torque setting

1：Bus voltagee　　5：DI input status　　9：Count value

2：AI 1 input voltage　　6：PI D setting　　A~F：Reserved

3：AI 2 input voltage　　7：PI D feedback

Ten’s digit:

Same as the setting of unit’s digit.

Hundred’s digit:

Same as the setting of unit’s digit.

Thousand’s digit:

Same as the setting of unit’s digit.

P10.05	Load speed display coefficient	Range：0.0~1000.0%	Default：100.0%	○

After setting the this parameter, use P26. 24 to monitor the load speed(can be the number of rotation or length) directly.

6. 11 P11 multi-reference parameter

Multi-frequency setting is used in multi-speed operation mode and simple PLC. When frequency source A or B is selected to multi-reference, the running frequency of the inverter ill run as the multi-speed.

P11.00	Multi-reference source 0	Range：0~7	Default：0	◎

This parameter is used set setting method for multi-reference source 0. The method is shown below:

0：set in P11. 01

1：AI 1

2：AI 2

3：AI 3

4：PULSE-I N

5：MODBUS communication setting

6：PI D control

7: Digital setting + UP/DOWN

P11.01	Multi-reference 0	Range：-100.0%~100.0%	Default：0.0%	○
P11.02	Multi-reference 1	Range：-100.0%~100.0%	Default：0.0%	○
P11.03	Multi-reference 2	Range：-100.0%~100.0%	Default：0.0%	○
P11.04	Multi-reference 3	Range：-100.0%~100.0%	Default：0.0%	○
P11.05	Multi-reference 4	Range：-100.0%~100.0%	Default：0.0%	○
P11.06	Multi-reference 5	Range：-100.0%~100.0%	Default：0.0%	○
P11.07	Multi-reference 6	Range：-100.0%~100.0%	Default：0.0%	○
P11.08	Multi-reference 7	Range：-100.0%~100.0%	Default：0.0%	○
P11.09	Multi-reference 8	Range：-100.0%~100.0%	Default：0.0%	○
P11.10	Multi-reference 9	Range：-100.0%~100.0%	Default：0.0%	○
P11.11	Multi-reference 10	Range：-100.0%~100.0%	Default：0.0%	○
P11.12	Multi-reference 11	Range：-100.0%~100.0%	Default：0.0%	○
P11.13	Multi-reference 12	Range：-100.0%~100.0%	Default：0.0%	○
P11.14	Multi-reference 13	Range：-100.0%~100.0%	Default：0.0%	○
P11.15	Multi-reference 14	Range：-100.0%~100.0%	Default：0.0%	○
P11.16	Multi-reference 15	Range：-100.0%~100.0%	Default：0.0%	○

100% of multi-reference corresponds to the maximum output frequency P00. 08 and the symbol “-“ means the reverse

operation. 16 speeds can be set for the inverter via the combination of DI n1, DI n2, DI n3 and DI n4, which corresponds to multi-speed 0 to multi-speed 15 respectively.

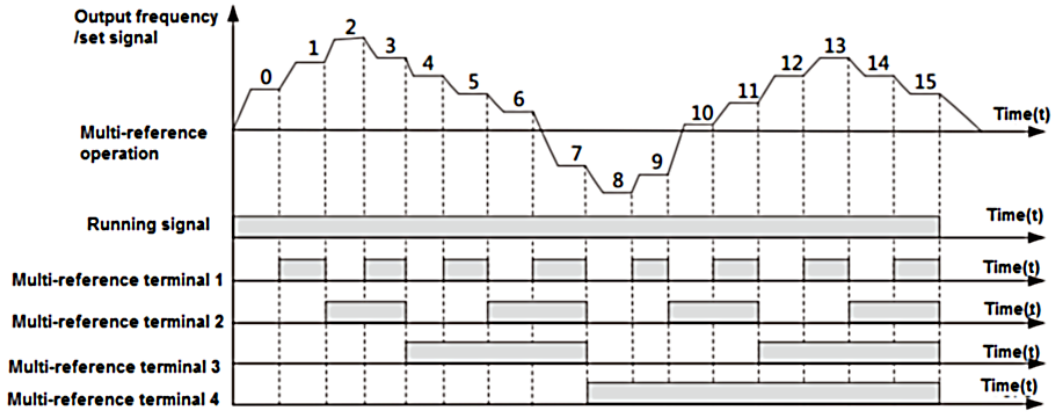


Figure 6-25 Multi-reference operation

As shown above, when 2 speeds is required, only 1 input terminal is needed; Similarly, when 3 ~4 speeds is required, 2 input terminals are needed; When 5~8 speeds required, 3 input terminals are needed; When 9~16 speeds required, 4 input termimals are needed. When DI n 1 =DI n 2 =DI n 3 =DI n 4 =OFF, the setting method for multi-reference 0 frequency is selected in P 1 1 . 0 0. When DI n1=DI n2=DI n3=DI n4 are not completely OFF, multi-speed run and the multi-speed is priority is higher than the operation panel, analog, high-speed pulse, PLC and communication input. Up to 16 speeds can be selected via the combination of DI n1, DI n2, DI n3 and DI n4.

The start/stop of multi-speed operation is set in P00. 02. The relationship between DI n1, DI n2, DI n3, DI n4 terminals and multi-speed are shown below:

DIn1	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DIn2	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DIn3	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DIn4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON
Reference	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

6. 12 P12 simple PLC parameters

Simple PLC is a multi-speed generator, which corresponds to 16 speeds of multi-frequency and multu-speed. The inverter can change the running frequency automatically based on the operation time to satisfy the technological requirement. Before, this function is completed by the external PLC. But the inverter itself can realize this function. This series of inverter can realize 16 speeds control and there are 4 groups of acceleration/deceleration time which can be selected. After the PLC completes one cycle, the multi-functional digital output terminal or multi-functional relay output terminal becomes ON. When the frequency source A or B is selected for simple PLC, the running frequency of inverter will operate with simple PLC.

P12.00	Simple PLC running mode	Range：0~2	Default：0	○

This parameter is used to set running mode for PLC cycle.

0：Stop after the inverter runs one cycle

The inverter stops after running one cycle, and will not start up until receiving another command.

1：Keep final values after the inverter runs one cycle

The inverter keeps the final running frequency and direction after running one cycle.

2：Repeat after the inverter runs one cycle

The inverter automatically starts another cycle after running one cycle, and will not stop until receiving the stop command.

P12.01	Simple PLC retentive selection	Range：0~3	Default：0	○

This parameter is used to set the retentive selection for simple PLC upon stop or power-failure.

0： Not retentive upon power-failure and stop

1： Not retentive upon stop, retentive upon power-failure

2： Retentive upon stop, not retentive upon power-failure

3： Retentive upon power-failure and stop

P12.02	Time unit of simple PLC running	Range：0~2	Default：0	○

This parameter is used to set the time unit for simple PLC.

0：s（second）

1：mi n（minute）

2：h（hour）

P12.03	Reserved

P12.04	Running time of simple PLC reference 0	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.05	Acceleration/deceleration time of simple PLC reference 0	Range：0~3	Default：0	○
P12.06	Running time of simple PLC reference 1	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.07	Acceleration/deceleration time of simple PLC reference 1	Range：0~3	Default：0	○
P12.08	Running time of simple PLC reference 2	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.09	Acceleration/deceleration time of simple PLC reference 2	Range：0~3	Default：0	○
P12.10	Running time of simple PLC reference 3	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.11	Acceleration/deceleration time of simple PLC reference 3	Range：0~3	Default：0	○
P12.12	Running time of simple PLC reference 4	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.13	Acceleration/deceleration time of simple PLC reference 4	Range：0~3	Default：0	○
P12.14	Running time of simple PLC reference 5	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.15	Acceleration/deceleration time of simple PLC reference 5	Range：0~3	Default：0	○
P12.16	Running time of simple PLC reference 6	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.17	Acceleration/deceleration time of simple PLC reference 6	Range：0~3	Default：0	○
P12.18	Running time of simple PLC reference 7	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.19	Acceleration/deceleration time of simple PLC reference 7	Range：0~3	Default：0	○
P12.20	Running time of simple PLC reference 8	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.21	Acceleration/deceleration time of simple PLC reference 8	Range：0~3	Default：0	○

P12.22	Running time of simple PLC reference 9	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.23	Acceleration/deceleration time of simple PLC reference 9	Range：0~3	Default：0	○
P12.24	Running time of simple PLC reference 10	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.25	Acceleration/deceleration time of simple PLC reference 10	Range：0~3	Default：0	○
P12.26	Running time of simple PLC reference 11	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.27	Acceleration/deceleration time of simple PLC reference 11	Range：0~3	Default：0	○
P12.28	Running time of simple PLC reference 12	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.29	Acceleration/deceleration time of simple PLC reference 12	Range：0~3	Default：0	○
P12.30	Running time of simple PLC reference 13	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.31	Acceleration/deceleration time of simple PLC reference 13	Range：0~3	Default：0	○
P12.32	Running time of simple PLC reference 14	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.33	Acceleration/deceleration time of simple PLC reference 14	Range：0~3	Default：0	○
P12.34	Running time of simple PLC reference 15	Range：0.0~6553.5s（min, h）	Default：0.0s（min, h）	○
P12.35	Acceleration/deceleration time of simple PLC reference 15	Range：0~3	Default：0	○

The parameters above are used to set the running time and acceleration/ deceleration time for simple PLC. The running frequency and operation direction of each reference corresponds to ones in multi-speeds. If the running time is 0, it will come to the next reference directly. But if the running frequency is 0, the inverter will keep frequency 0Hz output for this reference.

6. 13 P13 fault and protection function parameters

P13.00	Reserved			
P13.01	Overload warning selection	Range：0x0000~0x0111	Default：0x0000	○

Unit’s digit： Detection selection

0：Always detect. The overload warning always works at inverter running.

1：Detect only at constant speed. The overload warnig works only when inverter runs at constant speed.

Ten’s digit： Detection condition selection

0：Relative to motor rated current.

1：Relative to inverter rated current.

Hundred’s digit：Warning selection

0：No alarm and continue to run. When the output current of inverter exceeds the value set in P13. 02 and running time exceeds the value set in P13. 03, the inverter has no alarm and continues to run. If DO output setting is set to (8 overload warning output), the DO terminal becomes ON.

1：Alarm output and coast to stop. When the output current of inverter exceeds the value set in P13. 02 and running time exceeds the value set in P13. 03, the inverter gives alarms and coasts to stop. If DO output setting is set to (8 overload warning output), the DO terminal becomes ON.

Hundred’s digit：Reserved

P13.02	Overload warning detection	Range：20.0%~200.0%	Default：130.0%	○

This parameter is the current threshold of overload warning. When the Ten’s digit of P13. 01 is set to 0, the setting value is a percentage of rated motor current; When the Ten’s digit of P13. 01 is set to 1, the setting value is a percentage of rated inverter current.

P13.03	Detection time of overload warning	Range：0.1~60.0s	Default：5.0s	○

Set the duration time of which the output current is larger than the value set in P13. 02 Overload warning detection level.

P13.04	Phase loss protection	Range：0x0000~0x0011	Default：0x0000	○

Unit’s digit：Input phase loss protection

0：Enabled

1：Disabled

Ten’s digit：Output phase loss protection

0：Enabled

1：Disabled

It is used to determine whether to perform phase loss protection at the input or output side of inverter.

P13.05	Lightload warning selection	Range：0x0000~0x0111	Default：0x0000	○

Unit’s digit： Detection selection

0：Always detect. The lightload warning always works at inverter running.

1：Detect only at constant speed. The lightload warnig works only when inverter runs at constant speed.

Ten’s digit： Detection condition selection

0：Relative to motor rated current

1：Relative to inverter rated current.

Hundred’s digit：Warning selection

0：No alarm and continue to run. When the output current of inverter is lower than the value set in P13. 06 and running time exceeds the value set in P13. 07, the inverter has no alarm and continues to run. If DO output setting is set to (9 lightload warning output), the DO terminal becomes ON.

1：Alarm output and coast to stop. When the output current of inverter is lower than the value set in P13. 06 and running time exceeds the value set in P13. 07, the inverter gives alarms and coasts to stop. If DO output setting is set to (9 lightload warning output), the DO terminal becomes ON.

Thousand’s digit：Reserved

P13.06	Lightload warning detection level	Range：0.0%~200.0%	Default：30.0%	○

This parameter is the current threshold of lightload warning. When the Ten’s digit of P13. 05 is set to 0, the setting value is a percentage of rated motor current; When the Ten’s digit of P13. 05 is set to 1, the setting value is a percentage of rated inverter current.

P13.07	Detection time of lightload warning	Range：0.1~60.0s	Default：5.0s	○

Set the duration time of which the output current is lower than the value set in P13. 06 lightload warning detection level.

P13.08	Reserved			
P13.09	Short-circuit to ground upon power-on	Range：0~1	Default：1	○

0：Disabled

1：Enabled

It is used to determine whether to check the motor is short-circuited to ground at power-on of the inverter. If this function is enabled, the inverter's UVW will have voltage output a while after power-on

P13.10~P13.16	Reserved			
P13.17	Cooling fan control	Range：0~1	Default：0	○

0：Fan working during running

1：Fan working continuously

It is used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the inverter is in running state. When the inverter stops, the cooling fan works if the heatsink temperature is higher than 40°C, and stops working if the heatsink temperature is lower than 40°C. In this mode, the service life of cooling fan can be greatly improved.

If this parameter is set to 1, the cooling fan keeps working after power-on.

P13.18	Reserved			○
P13.19	Under-voltage setting	Range：50.0%~100.0%	Default：60.0%	○

When the bus voltage of inverter is lower than the value set in P13.19 at start or running, the inverter is in under-voltage state and error code of Er 022 will occur.

P13.20	Fault auto reset times	Range：0~20	Default：0	○

It is used to set the times of fault auto resets if this function is used. After the value is exceeded, the inverter will remain in the fault state.

P13.21	DO action during fault auto reset	Range：0：Not act 1：Act	Default：0	○

It is used to decide whether the DO acts during the fault auto reset if the fault auto reset function is selected.

P13.22	Time interval of fault auto reset	Range：0.1s~60.0s	Default：1.0s	○

It is used to set the waiting time from the alarm of the inverter to fault auto reset.

Notes: Auto reset is that after the error occurs during running, the inverter’s fault automatically resets and continues to run after the time interval of fault auto reset. But not all the errors support fault auto reset. Such as hardware overcurrent fault.

The errors supporting auto reset are shown below:

Code	Fault description
Er002	Overcurrent during acceleration
Er003	Overcurrent at constant speed
Er004	Overcurrent during deceleration
Er005	Overvoltage during acceleration
Er006	Overvoltage at constant speed
Er007	Overvoltage during deceleration
Er008	Inverter overload
Er009	Motor overload
Er011	Power output phase loss
Er015	Power input phase loss
Er024	Communication fault
Er029	PID feedback overlimit
Er030	PID feedback loss
Er031	Overload warning
Er032	Lightload warning

P13.23	Voltage adjustment selection	Range：0x0000~0x0111	Default：0x0001	○

Unit’s digit： Overvoltage stall adjustment

0：Disabled

1：Enabled

When the short-time regenerative braking occurs in the deceleration or running for the motor with large load, the energy will feedback to the inverter, which may cause the DC bus voltage to rise and lead to overvoltage protection. The

overvoltage stall function is used to compare the bus voltage with the overvoltage stall protective voltage set in P13. 24. If the bus voltage exceeds the value set in P13. 24, the output frequency of inverter will be adjusted instaneously and the deceleration timewill be extended automatically to keep the DC bus voltage stable. After selecting overvoltage stall function, the instaneous output frequency at constant speed may fluctuate in a short time and the deceleration time may be extended automatically. So pay special attention to select this function for the applications where frequency fluctuation or deceleration time change is not allowed.

Ten’s digit：Undervoltage adjustment

0：Disabled

1：Enabled

Undervoltage stall function is to decrease appropriately the output frequency of inverter upon instaneous undervoltage or power-failure. The load energy feedback to the inverter to compensate the DC bus voltage drop, which can keep the inverter continuous operation in a short time.

Hundred’s digit：Over modulation selection

0：Disabled

1：Enabled

Thousand’s digit：Reserved

P13.24	Overvoltage stall protective voltage	Range：110%~150%	Default：130%	○

When the unit’s digit of P13. 23 is set to Enabled, if the DC bus voltage exceeds this setting value, the output frequency will be adjusted automatically and deceleration time will be extended. The voltage is relative to the percentage of the standard DC bus voltage.

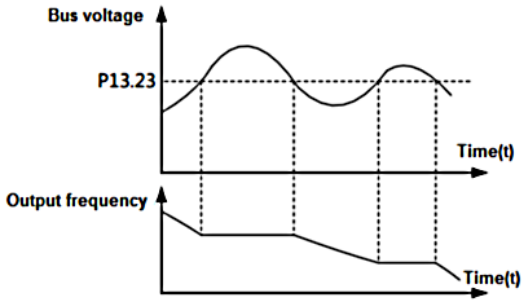


Figure 6-26 Overvoltage stall protection function

P13.25	Energy braking action selection	Range：0~1	Default：0	○

0：Disabled

1：Enabled

Energy braking is a kind of braking method of rapid deceleration which converts power energy into braking resistance heat during deceleration. This function is applicable for the applications wih the braking of large inertia load or rapid braking. So it is necessary to select the suitable braking resistor and braking unit.

P13.26	Energy braking protective voltage	Range：110%~150%	Default：130%	○

When P13.25 is set to Enabled and the bus voltage of inverter reaches the value set in P13.26, the IGBT in internal baking unit is connected and the energy will be released quickly via braking resistor to realize the rapid braking. This value can be used to adjust the braking effect of braking unit.

P13.27	Overvoltage stall gain	Range：0~200%	Default：50	◎
P13. 28~P13. 29	Reserved			

Set overvoltage stall gain to avoid false fault of overvoltage when deceleration time is too short.

P13.30	Fault record selection	Range：0~3	Default：0	○

The E-series inverter can keep the last four fault record. This parameter is used to select the record that the user needs to view. Notes: The larger the ID value is, the earlier the fault occurs.

Select the latest fault information to view via P13. 30 setting and pay special attention to the No. difference between the fault and no fault.

Fault:	No fault:
0: Select to view the current fault information	0: Select to view the last fault information
1: Select to view the last fault information	1: Select to view the last but one fault information
2: Select to view the last but one fault information	2: Select to view the last but two fault information
3: Select to view the last but two fault information	3: Select to view the last but three fault information

P13.31	Fault code	●

This parameter is used to view the fault code. If “0” is displayed, it means no fault.

The fault codes are shown below:

Fault code	Fault description	Fault code	Fault description
0	No fault	14	Contactor fault
1	Short-circuit to ground	15	Input phase loss
2	Overcurrent during acceleration	16~21	Reserved
3	Overcurrent at constant speed	22	Undervoltage
4	Overcurrent during deceleration	23	External equipment fault
5	Overvoltage during acceleration	24	Communication fault
6	Overvoltage at constant speed	25	Module overheat
7	Overvoltage during deceleration	26	EEPROM read-write fault
8	Inverter overload	27	Running time reached
9	Motor overload	28	Power-on time reached
10	Current offset	29	PID feedback overlimit
11	Ouput phase loss	30	PID feedback loss
12	Hardware overcurrent	31	Overload warning
13	Parameters identification fault	32	Lightload warning

P13.32	Running frequency upon fault	
P13.33	Output current upon fault	
P13.34	Bus voltage upon fault	
P13.35	Output voltage upon fault	
P13.36	Input terminal status upon fault	
P13.37	Output terminal status upon fault	
P13.38	Module temperature	
P13.39	Accumulatvie running time upon fault (hour)	●
P13.40	Accumulatvie running time upon fault (second)	

The parameters of P13. 32 to P13. 40 make a record of fault information, so that the user can make better analysis and treatment.

6. 14 P14 communication parameters

P14.00	Reserved			
P14.01	Baud rate	Range：0~5	Default：2	○

0：2400bps

1：4800bps

2：9600bps

3：19200bps

4：38400bps

5：57600bps

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

Notes: The baud rate of host computer must be the same as that of inverter. Otherwise, communication shall fail. The higher baud rate is, the faster communication will be. But this is more susceptible to interference from the outside environment. So select the appropriate baud rate based on the actual needs and outside environment.

P14.02	Data format	Range：0~5	Default：0	○

0：No parity（N，8，1），RTU

1：Even parity（E，8，1），RTU

2：Odd parity（O，8，1），RTU

3：No parity（N，8，2），RTU

4：Even parity（O，8，2），RTU

5：Odd parity（E，8，2），RTU

This parameter is used to set the data format between host controller and inverter. Note that data format of host computer must be the same as that of inverter. Otherwise, communication shall fail.

P14.03	Local address	Range：0~247	Default：1	○

When local address is set to 0 (that is, broadcast address), the inverter can only receive and execute broadcast commands of host computer, but will not respond to host computer. This address is unique, which is basis for point-to-point communication between host computer and inverter.

Notes: The slave address cannot be set to 0 when you need to read the operation data of inverter.

P14.04	Response delay	Range：0ms~200ms	Default：0ms	○

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

P14.05	Communication timeout	Range：0.0s~60.0s	Default：0.0s	○

When this parameter is set to 0.0s, system does not detect communication timeout. When the inverter does not receive communication signal within time set in this parameter, it detects communication timeout fault Er 018. Generally, this parameter is set to 0.0s. In applications with continuous communication, you can use this parameter to monitor communication status.

P14.06	Communication fault processiing	Range：0~1	Default：0	○

This parameter is used to set the action for the inverter after communicaton fault occurs.

0：No alarm and continue to operate

1：Alarm occurs and coast to stop

6. 15 P20 Motor 2 parameters

P20.25	Motor 2 type selection	Range：0~2	Default：0	◎

0：V/F control

1：Sensorless vector control（SVC）

2：Feedback vector control（FVC）

When motor 2 is selected, the operation mode for motor is decided by P20. 25.

P20.26	Acceleration/ deceleration time for motor 2	Range：0~3	Default：1	○

0：Acceleration/Deceleration time 1

1：Acceleration/Deceleration time 2

2：Acceleration/Deceleration time 3

3：Acceleration/Deceleration time 4

When motor 2 is selected, but no simple PLC operates and acceleration/ deceleration terminal not act, the acceleration/ deceleration time is decided by P20. 26.

P20.27	Rotation direction for motor 2	Range：0~2	Default：0	○

0：Same direction

1：Reverse direction

2：Direction prohibition

When motor 2 is selected, the motor running direction is decided by P20. 27.

For other parameters of motor 2, refer to the description o f Group P02(motor 1).

6. 16 P21 motor 2 vector control parameters

For details, refer to the parameters of Group P03 motor 1 vector control.

6. 17 P22 motor 2 V/F control parameters

For details, refer to the parameters of Group P04 motor V/F control.

6. 18 P24 Factory-defined parameters:

P24.00	Factory password	Range：0~65535	Default：00000	○

For the parameters the factory defines, it’ s not necessary for user to change it. So it is prohibited for user to access into this group of parameter to view or modify. Failure to do so may cause unexpected action or serious accidents.

6. 19 P26 status monitoring parameters

P26.00	Set frequency			●
P26.01	Running frequency			●
P26.02	Bus voltage			●
P26.03	Output voltage			●
P26.04	Output current			●
P26.05	Output power			●
P26.06	Set torque			●
P26.07	Output torque			●
P26.08	PID setting			●
P26.09	PID feedback			●
P26.10	Output rotational speed			●

P26.11	DI input state			●
P26.12	DO input state			●
P26.13	AI1 input			●
P26.14	AI2 input			●
P26.15	AI3 input			●
P26.16	AO1 output			●
P26.17	AO2 output			●
P26.18	Reserved			
P26.19	PULSE input pulse frequency			●
P26.20	PULSE output pulse frequency			●
P26.21	Count value			●
P26.22	Reserved			
P26.23	Feedback length			●
P26.24	Lower byte of load speed			●
P26.25	Higher byte of load speed			●
P26.26	PLC stage			●
P26.27	Frequency source A			●
P26.28	Frequency source B			●
P26.29	Output synchronous frequency			●
P26.30	Current running time			●
P26.31	Current power-on time			●
P26.32	Accumulative running time			●
P26.33	Accumulative power-on time			●
P26.34	Product code			●
P26.35	Software version No. of drive			●
P26.36	Rated power of inverter			●
P26.37	Rated voltage of inverter			●
P26.38	Rated current of inverter			●
P26.39	Module temperature 1			●
P26.40	Module temperature 2			●
P26.41	Software version No. of operation			●
P26.42	Software code			●

Chapter 7 EMC(Electromagnetic compatibility)

7.1 Definition of Terms

Electromagnetic compatibility (EMC) describes the ability of electronic and electrical devices or systems to work properly in the electromagnetic environment and not to generate electromagnetic interference that influences other local devices or systems.

7.2 Introduction to EMC Standard

E-series inverter satisfies the requirements of standard I EC/EN61800-3：2004.

IEC/EN61800-3 mainly makes the investigation for the inverter from electromagnetic interference and anti-electromagnetic interference. Electromagnetic interference mainly tests the radiation interference, conduction interference and harmonic interference of the inverter(the inverter for civilian use has this requirement). The anti - electromagnetic interference mainly tests the transmission resistance of inverter, radiation immunity, surge immunity, fast pulse immunity, ESD immunity and low frequency end immunity

7.3 EMC instructions

During the installation and usage of inverter, please follow the instructions in this section to have good electromagnetic compatibility in the general industrial environment.

7. 3.1 Harmonics influence

The higher harmonics of the power supply may damage the inverter. Therefore, in some places where the quality of the power grid is poor, it is recommended to add ac input reactor.

7.3.2 Electromagnetic interference and installation instructions

EMC includes two aspects: The electromagnetic interference generated by a device or system must be restricted within a certain limit; the device or system must have sufficient immunity to the electromagnetic interference in the environment.

Installation instructions:

1) Make sure the inverter and other devices must be well grounded.

2) The power input and output cables of the inverter and weak-current signal cables(such as control cable) should be laid vertically (if possible) rather than in parallel.

3) It is recommended that a shielded cable be used as the output power cable of the inverter; the cable shield must be well grounded. For devices suffering from interference, shielded twisted pair (STP) cable is recommended as the lead wire and the cable shield must be well grounded.

4) If the motor cable is over 100 meters long, an output filter or reactor is required.

7.3.3 Solutions of interference caused by other electrical devices to the inverter:

The reason for the electromagnetic influence to the inverter is that there are lots of relays, contactors or electricmagnetic brake installed around the inverter. When the inverter interferes with other devices, adopt the following solutions:

1) Contect a surge suppressor to the interferenced components;

2) Connect the filter to the input side of inverter. For details, refer to subsection 7. 3. 6.

3) Shielded twisted pair (STP) cable is recommended as the lead wire and control line and the cable shield must be well grounded.

7. 3. 4 Solutions of interferences caused by inverter to other electrical devices:

This noise has two kinds: radiated interference and conducted interference. These two kinds of interference make the peripheral electrical equipment electromagnetic or electrostatic induction, which may lead to misoperation. Take the following solutions for different interference.:

1) If the measurement instrument, receiver and sensor, whose signal is usually weak, stay close to the inverter or installed in the same cabinet with inverter, they are liable to be interferenced. Then take the following solutions: Try to

stay away from the interference source; Do not arrange the signal line and power line in parallel, especially not bundle them together; Shielded twisted pair (STP) cable is recommended for the signal line and power line and the cable shield must be well grounded; Install the ferrite magnetic core at the output side of inverter (suppression frequency is within the range of 30~ 1000MHz) and wind two or three coils in the same direction. For the applications where suffers severe interference, install EMC output filter.

2) The conducted interference may occur when the interference devices and inverter use the same power. If the methods above cannot eliminate the interference, add the EMC filter between the inverter and power supply.(For details, refer to subsection 7. 3. 6)

3) Peripheral devices should be grounded independently to avoid the interference caused by the leakage current at common grounding.

7. 3. 5 Leakage current and solutions:

There are two kinds of leakage current when using inverter: Earth leakage current and leakage current between lines.

1) Causes and solutions for earth leakage current: There is distributed capacitance between the conductor and earth, and the larger the distributed capacitance, the larger the leakage current. Reducing the distance between the inverter and motor can help reduce the distributed capacitance. The larger the carrier frequency, the larger the leakage current . Reducing the carrier frequency also can help reduce the distributed capacitance. But take care reducing the carrier frequency also can increase the noise of motor. Adding a reactor is also an efficient way for eliminating the leakage current.

Leakage current increases as circuit current increases. So if the motor power is large, the corresponding leakage current will be large.

2) Causes and solutions for leakage current between lines:

There is a distributed capacitance between the output wiring of the inverter. If the current of the circuit is higher harmonics, the leakage current may occur by resonance. If thermal relay is used at this time, misoperation may occur.

The solution is to reduce the carrier frequency or add the output reactor. It is recommended not to use thermal relay between inverter and motor and use overcurrent protection function.

7. 3. 6 Instructions of adding EMC input filter to the power input side:

⚠WARNING
• Strictly comply with the ratings when using the EMC filter. The EMC filter is category I electric apparatus, and therefore, the metal housing ground of the filter should be in good contact with the metal ground of the installation cabinet on a large area, and requires good conductive continuity. Otherwise, it will result in electric shock or poor EMC effect. • The ground of the EMC filter and the PE conductor of the inverter must be tied to the same common ground. Otherwise, the EMC effect will be affected seriously • The EMC filter should be installed as closely as possible to the power input side of the inverter.

Chapter 8 Maintenance and Troubleshooting

8. 1 Error codes and solutions

The inverter provides a total of 24 pieces of fault information and protective functions. If the fault occurs, the inverter

fault relay acts. Before contacting HCFA Corporation, for technical support, you can first determine the fault type, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the agent or HCFA Corporation.

If a fault occurs, the inverter implements the protection function, and displays the fault code with 2 to 5 letters and numbers on the operation panel (if the operation panel is available).

Solutions to the faults are shown below:

Display	Error type	Possible Causes	Solutions
Er001	Short-circuit to ground	1: The motor insulation is abnormal. 2: The output circuit is grounded or short circuited 3: The inverter module is faulty. 4: The leakage current to the ground is too large.	1: Check if the motor insulation is damaged or damped 2: Check the motor wirng and earth impedance 3: Contact the agent or HCFA Corporation 4: Contact the agent or HCFA Corporation
Er002	Overcurrent during acceleration	1: The acceleration time is too short. 2: Motor parameters are incorrect. 3: The voltage is too low. 4: The power of inverter is too low. 5: V/F curve is not appropriate. 6: The load is too heavy. 7: The startup operation is performed on the rotating motor.	1: Increase the acceleration time. 2: Perform the motor autotuning. 3: Check the input power. 4: Select an inverter of higher power class. 5: Adjust the manual torque boost or V/F curve. 6: Remove the added load. 7: Start DC braking
Er003	Overcurrent at constant speed	1: A sudden load is added during operation. 2: The voltage is too low. 3: The inverter model is of too small power class.	1: Remove the added load. 2: Check the input power. 3: Select an inverter of higher power class.
Er004	Overcurrent during deceleration	1: The inertia of load is too large 2: The deceleration time is too short. 3: The voltage is too low..	1: Enable energy braking 2: Increase the deceleration time 3: Check the voltage.
Er005	Overvoltage during acceleration	1: The input voltage is abnormal. 2: The startup operation is performed on the rotating motor upon instantaneous power-failure.	1: Check the input power. 2: Avoid restarting upon stop
Er006	Overvoltage at constant speed	1: The input voltage is abnormal. 2: Input voltage changes abnormally 3: The inertia of load is too large	1: Check the input power. 2: Install a reactor 3: Install the braking unit and braking resistor.
Er007	Overvoltage during deceleration	1: The deceleration time is too short. 2: The inertia of load is too large 3: The input voltage is abnormal.	1: Increase the deceleration time. 2: Increase the braking unit and braking resistor. 3: Check the input power.
Er008	Inverter overload	1: The acceleration/deceleration time is too short. 2: The startup operation is performed on the rotating motor.	1: Increase the acceleration/ deceleration time 2: Avoid restarting upon stop 3: Check the voltage 4: Select an inverter of higher power class.

		3: The voltage is too low. 4: The load is too large 5: Torque boost is too large at V/F control 6: The motor parameters is not appropriate	5: Reduce the torque boost 6: Make the correct setting according to the motor nameplate
Er009	Motor overload	1: The voltage is too low. 2: The motor parameters is not appropriate 3: The load is too heavy or lockedrotor occurs on the motor.	1: Check the voltage 2: Make the correct setting according to the motor nameplate 3: Check the load and adjust the torque boost
Er010	Current detection fault	1: The control board connector is in bad contact. 2: Auxiliary power supply is faulty. 3: The HALL device is faulty. 4: Amplifying circuit is faulty.	1: Check the connector and reconnect. 2: Contact the agent or HCFA Corporation 3: Contact the agent or HCFA Corporation 4: Contact the agent or HCFA Corporation
Er011	Power output phase loss	1：U, V, W output phase loss 2: The inverter's three-phase outputs are unbalanced	1: Check the output wiring 2: Check the motor and cables
Er012	Hardware overcurrent	1: Overcurrent 2: Input power is abnormal. 3: Motor output is abnormal. 4: The inverter module is faulty.	1: Handle based on overcurrent 2: Check the input voltage 3: Check the motor and cables 4: Contact the agent or HCFA Corporation
Er013	Parameter fault	1: The motor and inverter do not match 2: The motor parameters are set incorrectly 3: The deviation between auto-tuning parameters and standard parameters is too large 4: The auto-tuning times out.	1: Change another inverter 2: Set the parameters based on the motor nameplate 3: Make the motor no load and recognize again 4: Check motor wiring and parameter setting
Er014	Contactor fault	1: The voltage is too low 2: The buffer resistance is faulty upon power-on 3: The contactor is faulty 4: The control circuit is faulty	1: Check the input voltage 2: Replace the buffer resistance and consult agent and HCFA Corporation 3: Replace the contactor and consult agent and HCFA Corporation 4: Consult agent and HCFA Corporation
Er015	Power input phase loss	Input R, S, T phase loss	1: Check the input power 2: Check the wiring
Er016~Er020		Reserved	
Er021	Software version not compatible	1：The number of parameters stored in panel and displayed in inverter is different 2：Software version No. is different	1：Check the input power 2：RESET
Er022	Bus undervoltage	1: The voltage is too low. 2: Instantaneous power-failure	1: Check the input power 2: RESET

Er023	External equipment fault	External fault signal is input via DI.	Check external equipment input.
Er024	Communication fault	1: The baud rate between host computer and inverter is different. 2: The communication parameters of inverter are set improperly. 3: The communication cable is disconnected 4: The host computer works or not	1: Set the same baud rate 2: Set proper communication parameters 3: Check the communication port wiring 4: Check if the host computer works or not
Er025	Module overheat	1: The inverter overcurrent instantaneously. 2: The output circuit is grounded or short circuited. 3: The air filter is blocked or the fan is damaged. 4: The ambient temperature is too high. 5: Control board connection or components loosen 6: The auxiliary power is damaged and the voltage is too low 7: Power module bridge arm is shoot-through 8: Control board is faulty.	1: Handle based on overcurrent 2: Arrange the wiring again 3: Clean the air filter or replace the fan 4: Lower the ambient temperature. 5: Check and reconnect 6: Consult agent and HCFA Corporation 7: Consult agent and HCFA Corporation 8: Consult agent and HCFA Corporation
Er026	EEPROM read-write fault	1: Parameters read-write fault occur. 2: The EEPROM chip is damaged.	1: Press the STOP/RSTbutton or consult 2: Consult agent and HCFA Corporation
Er027	Accumulative running time reached	The accumulative running time reaches the setting value	Clear the record through the parameter initialization function.
Er028	Accumulative power-on time reached	The accumulative power-on time reaches the setting value.	Clear the record through the parameter initialization function.
Er029	PID feedback overlimit during running	The feedback reaches the upper limit.	Check if the feedback source device is faulty or not.
Er030	PID feedback loss	1: PID feedback loss 2: PID feedback source disappear	1: Check PID feedback signal line 2: Check PID feedback source
Er031	Overload warning	1: The load is too heavy. 2: Overload warning threshold value and time is set improperly. 3: The motor parameters are set improperly	1: Reduce the load 2: Set appropriate threshold value and time 3: Make the correct setting based on the motor nameplate 4: Refer to the description of P13. 01 to OFF the alarm output
Er032	Lightload warning	1: Load becoming 0 2: Lightload warning threshold value and time is set improperly. 3: The motor parameters are set	1: Check if the load is disconnected. 2: Set appropriate threshold value and time 3: Make the correct setting based on the motor nameplate

		improperly	
Er033~Er098		Reserved	
Er099	Software error	Software error	Contact HCFA
Er100	Hardware error	Hardware error	Contact HCFA

8.2 Common faults and solutions

8.2.1 No display at power-on:

Use a multimeter to check whether the input power of inverter is consistent with the rated voltage. Then check if the rectifier bridge is damaged. If damaged, consult the agent or HCFA Corporation.

Check if the CHARGE LED lights. If not, the fault occurs generally on the rectifier bridge or buffer resistance. If lights, the fault may occur on the switching power supply. Then consult the agent or HCFA Corporation.

8. 2. 2 Power supply switch OFF at power-on:

Check whether the input power is short circuited to the ground. Then check if the rectifier bridge is damaged. If damaged, consult the agent or HCFA Corporation.

8. 2. 3 The motor not rotate after the inverter runs:

Check whether the three-phase outputs among U, V, W are balanced. If balanced, the fault may occur on the motor or motor cables or the locked-rotor occurs because of the mechanical faults. If there is output but three-phase is unbalanced, the drive board or output module may be damaged, then consult the agent or HCFA Corporation. If there is no output voltage, the drive board or output module may be damaged, then consult the agent or HCFA Corporation.

8. 2. 4 The inverter displays normally at power-on, but power supply switch OFF upon running:

①Check whether the short-circuit occur between the output modules. If YES, consult the agent or HCFA Corporation.

②Check whether there is a short circuit or grounding between the lead wires.

③If tripping occurs occasionally and the distance between the motor and inverter is too far, add an AC output reactor.

④Except the troubleshooting above, press STOP/ RESET button to have the reset operation and then restart the inverter.

⑤Except the troubleshooting above, turn off all phases of power supply to the inverter. After all the LEDs OFF, turn on the power again and restart the inverter.

⑥If the above method cannot solve the problem, make a record of the fault code, inverter’ s specifications and serial number, and then consult the technicians of HCFA Coprporation.

Chapter 9 Communication protocol

The E-series drive provides RS485 communication interface and supports Modbus-RTU communication protocol so that the user can implement centralized control, such as setting running commands and function codes, and reading running status and fault information of the inverter, by using a PC or PLC.

9. 1 Protocol

This Modbus protocol defines content and format of transmitted messages during serial communication, including master polling (or broadcasting) format and master coding method (function code for the action, transmission data, and error check). The slave uses the same structure in response, including action confirmation, data returning and error check. If an error occurs when the slave receives a message, or the slave cannot complete the action required by the master, the slave returns a fault message as a response to the master.

9. 2 Application

The E-series inverter is connected to a "single-master multi-slave" PC/PLC control network with RS485 bus.

9. 3 Bus structure

1) Interface mode: RS-485 interface

2) Transmission mode

The asynchronous serial and half-duplex transmission mode is used. During asynchronous serial communication, data is sent frame by frame in the form of message. At the same moment, either the master or the slave transmits data and the other can only receives data.

3) Topological structure

The system consists of a single master and multiple slaves. The address range of the slaves is 1 to 247, and 0 is broadcast address. A slave address must be unique in the network, which is the basis of Modbus serial communication.

9. 4 Protocol description

The communication protocol used by the inverter is the Modbus master-slave communication protocol, which allows the inverter to provide data to respond to "query/command" from the master or execute the action according to "query/command" from the master.

The master can be a PC, an industrial device, or a PLC. The salve can be the E-series inverter or control device with the same communication protocol. The master can communicate with a single slave or send broadcast messages to all slaves. When the master communicates with a single slave, the slave needs to return a message (response) to "query/command" from the master. For a broadcast message sent by the master, the slaves need not return a response.

9. 5 Frame format

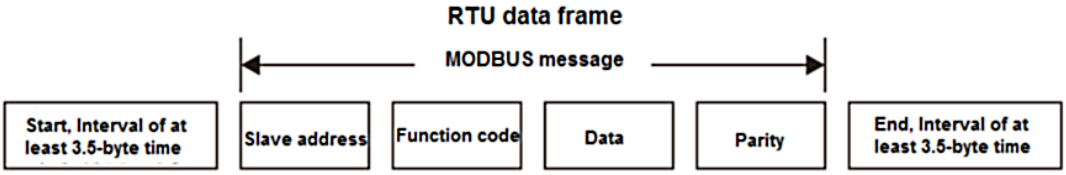
The E-series inverter supports Modbus-RTU mode.

In Modbus-RTU mode, the format for each byte is shown below:

Encoding system: 8-bit binary, for each 8-bit frame, including two hexadecimal characters. Hexadecimal is 0~9 and A~F.

Data format: start bit, 8 data bit, parity bit and stop bit. The description for data format is shown below: In the RTU mode, the new frame always starts with Frame header greater than the 3.5-byte transmission idle time. 3. 5 bytes of

transmission time can be easily grasped on the network where the transmission speed is calculated by baud rate. Then the data domain is transmitted sequentially: slave address, command code, data and CRC parity which are expressed in hexadecimal format. The nework device always monitors the status of communication bus. When receiving the first address information, the network device will check the byte. After the last byte is transmitted, another similar 3.5-byte transmission idle time occur, which marks the end of this frame. Then, another new frame begins to transmit.



A frame must be transmitted in a continuous data flow. If there is the interval time of 3.5-byte or more before the end of the whole frame transmission, the receiving device will clear the incomplete message, and regard the next byte as the address domain for the new frame by mistake. Similarly, if the the interval time between the new frame and the former frame is less than 3.5-byte, the receiving device regard it as the continuation of the former frame. Due to the frame confusion, the CRC verification value is not correct, which leads to the communication error. The structure for RTU:

Frame header　START	T1-T2-T3-T4（3. 5-byte transmission time）
Slave address ADDR	Communication address : 0 to 247(decimal), 0: Broadcast address
Command code CMD	03H:Read slave parameters　　06H: Write slave parameters
DATA（N-1）…DATA（0）	Data of 2*N bytes. This is the main part of the communication and data exchange.
CRC CHK low bytes	It is the detection value (CRC verification value)(16 bit)
CRC CHK high bytes	
END	T1-T2-T3-T4（3. 5-byte transmission time）
END Lo	

9. 6 Command code and communication data

9. 6. 1 Command code: 03H（0000 0011）, can read N words(up to 10 words can be read consecutively).

Example: For the slave address of 01H inverter, the memory start address is 0008(max. output frequency address) and can read one consecutive word. The frame description is shown below:

RTU master command:

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
Start address high bits（Parameter No.）	00H（Group P00）
Start address low bits（Parameter No.）	08H（Group P00 No. 08: P00.08）
Number of parameter high bits	00H
Number of parameter low bits	01H
CRC CHK low bits	05H
CRC CHK high bits	C8H
END	T1-T2-T3-T4

RTU slave response:

START	T1-T2-T3-T4
ADDR	01H
CMD	03H
Number of bytes	02H
Data address 0007H high bits	13H
Data address 0007H low bits	88H
CRC CHK low bits	B5H
CRC CHK high bits	12H
END	T1-T2-T3-T4

9. 6. 2 Command code：06H（0000 0110）, write one word

Example:

Write 5000（1388H）to 000CH(Digital set frequency) of slave address 01H inverter. The frame description is shown below:

RTU master command:

START	T1-T2-T3-T4
ADDR	01H
CMD	06H
Writing data address high bits	00H
Writing data address low bits	0CH
Parameter high bits	13H
Parameter low bits	88H
CRC CHK low bits	44H
CRC CHK high bits	9FH
END	T1-T2-T3-T4

RTU slave response:

START	T1-T2-T3-T4
ADDR	01H
CMD	06H
Writing data address high bits	00H
Writing data address low bits	0CH
Parameter high bits	13H
Parameter low bits	88H
CRC CHK low bits	44H
CRC CHK high bits	9FH
END	T1-T2-T3-T4

9. 6. 3 Command code: 10H（00010000）, write multiple words

Example:

Write 5000（1388H）to 9000H (communication frequency setting) of slave address 01H inverter. The frame description is shown below:

RTU master command:

START	T1-T2-T3-T4
ADDR	01H
CMD	10H
Writing data address high bits	90H
Writing data address low bits	00H
Number of parameter high bits	00
Number of parameter low bits	01
Number of data bytes	02
Parameter high bits	13H
Parameter low bits	88H
CRC CHK low bits	3BH
CRC CHK high bits	0FH
END	T1-T2-T3-T4

RTU slave response:

START	T1-T2-T3-T4
ADDR	01H
CMD	10H
Writing data address high bits	90H
Writing data address low bits	00H
Number of data high bits	00H
Number of data low bits	01H
CRC CHK low bits	2CH
CRC CHK high bits	C9H
END	T1-T2-T3-T4

9.6.4 Communication frame error check

The error frame check mainly consists of parity check(odd/ even check) and CRC check of the whole data.

9. 6. 4. 1 Parity check

User can select different parity check according to the actual needs or select no parity, which will affect the parity bit setting of each byte.

Even parity check: An even parity bit is attached to the data transmission to indicate whether the number of "1" in the transmitted data is odd or even. When it is even, the parity bit is set “0”, or set it to “1”, to keept the parity of the data.

Odd parity check: An odd parity bit is attached to the data transmission to indicate whether the number of "1" in the transmitted data is odd or even. When it is odd, the parity bit is set to “0”, or set it to “1”, to keep the parity of the data.

For example, When transmitting " 11001110", which contains five “1” in the data. If even parity is used, the even parity is ‘1’. If odd parity is used, the odd parity is “0”. When transmitting data, the parity bit is calculated and placed in the position of the parity bit of the frame. The receiving equipment also needs the parity. If the parity of the received data is different from the the preset parity, the communication failure occur.

9. 6. 4. 2 CRC check:

In Modbus-RTU mode, a message includes a CRC-based error-check field. The CRC field checks content of entire message. The CRC field is two bytes, containing a 16-bit binary value. The CRC field is calculated by transmitting device, and then added to message. The receiving device recalculates a CRC value after receiving message, and compares the calculated value with the CRC value in the received CRC field. If the two CRC value is different, there is an error in the transmission.

The CRC is first stored to 0xFFFF. Then a procedure is invoked to process the successive 6-bit byte or more in the message and the value in the register. Only the eight bits in each character are used for the CRC. The start bit, stop bit and the parity bit do not apply to the CRC.

During generation of the CRC, each eight-bit character is in exclusive-OR (XOR) with the content in the register. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register then performs XOR with a preset value.

If the LSB was a 0, no XOR is performed. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is in XOR with the register's current value, and the process repeats for eight more shifts as described above. The final value of the register, after all the bytes of the message have been applied, is the CRC value.

The calculation method of CRC adopts the CRC check rule of international standard. When users edit CRC algorithm, they can refer to CRC algorithm of relevant standard, and write the CRC calculation program that meets the requirements.

The CRC simple function is as follows(programming with C language):

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

In the ladder logic, the CRC value is calculated according to the frame content, and the look-up table method is simple and fast, but the program occupies a large ROM space. Please use carefully when you have requests for program space.

9. 6. 5 Definition of communication parameter addresses

The communication parameter addresses are used to control the operation of inverter, obtain the status information and set the relative function parameters.

1)Communication parameter addresses representation rule

The function code No. is used to express the parameter address and need to convert to hexadecimal. For example, the communication address of P05. 11 is expressed as 050BH; The communication address of P13. 22 is expressed as 0D16H.

Notes: Group P024 is the factory parameter, which cannot be read or modified; Some parameters cannot be modified when the inverter is running. Some parameter cannot be modified regardless of status of the inverter. In addition, pay attention to setting range, unit and description of parameters when modifying them.

Frequent storage to the EEPROM reduces its service life. Therefore, in communication mode, users can change values of certain parameters in RAM rather than storing the setting. Add 40H (Hexadecimal is 64) to the corresponding high order of the function code address to realize this function. For example, if function code P12. 02 needs to be stored in EEPROM, the address is expressed as 4C02H. It is an invalid address when being read. If just change the value and not be stored in EEPROM, the address is expressed as 0C02H.

1) Description of function code access operation:

Function code	Parameter address	Notes
P00 Basic parameters group	0000H（Not written into EEPROM）	1. Pay attention to the setting range when writing and whether the parameters can be modified or not when the inverter is running. Some parameters support read-only. The reserved parameters cannot be read or written into. 2. For the high-order bytes prefixed with 0 x 40, it supports write-only in EE PROM and RAM.
	4000H（Written into EEPROM）	
P01 Start/stop control parameter group	0100H（Not written into EEPROM）	
	4100H（Written into EEPROM）	
P02 motor 1 parameter group	0200H（Not written into EEPROM）	
	4200H（Written into EEPROM）	
P03 motor 1 vector control	0300H（Not written into EEPROM）	
	4300H（Written into EEPROM）	
P04 motor 1 V/F control	0400H（Not written into EEPROM）	
	4400H（Written into EEPROM）	
P05 input terminal	0500H（Not written into EEPROM）	
	4500H（Written into EEPROM）	
P06 output terminal	0600H（Not written into EEPROM）	
	4600H（Written into EEPROM）	
P08 process control PID	0800H（Not written into EEPROM）	
	4800H（Written into EEPROM）	
P09 special function	0900H（Not written into EEPROM）	
	4900H（Written into EEPROM）	
P10 operation panel and display parameters	0A00H（Not written into EEPROM）	
	4A00H（Written into EEPROM）	
P11 multi-reference parameters	0B00H（Not written into EEPROM）	
	4B00H（Written into EEPROM）	
P12 simple PLC function	0C00H（Not written into EEPROM）	
	4C00H（Written into EEPROM）	
P13 fault and protection function	0D00H（Not written into EEPROM）	
	4D00H（Written into EEPROM）	
P14 communication parameters	0E00H（Not written into EEPROM）	
	4E00H（Written into EEPROM）	
P20 motor 2 parameters	1400H（Not written into EEPROM）	
	5400H（Written into EEPROM）	
P21 motor 2 vector control	1500H（Not written into EEPROM）	
	5500H（Written into EEPROM）	
P22 motor 2V/F control	1600H（Not written into EEPROM）	
	5600H（Written into EEPROM）	

2）Description of status monitoring parameters:

Function code	Parameter address	Notes
P26 status monitoring parameters	1A00H	Support read-only.

E-series inverter can only read up to 12 consecutive address parameters. When reading in communication, you can simple specify the starting address and the number of words starting from the starting address. When reading the output voltage, output current and output power at inverter running, the starting address of communication parameters is written into 1803H and the number of word is written into 0003H. And the operation data returned by the inverter is output voltage, output current and output power.

The communication address and description for P26 status monitoring parameters is shown below:

Communication address	Parameter No.	Parameter description	Unit
1A00H	P26.00	Set frequency	0.01Hz
1A01H	P26.01	Running frequency	0.01Hz
1A02H	P26.02	Bus voltage	0.1V
1A03H	P26.03	Output voltage	0.1V
1A04H	P26.04	Output current	0.1A
1A05H	P26.05	Output power	0.1%
1A06H	P26.06	Output torque	0.1%
1A07H	P26.07	Set torque	0.1%
1A08H	P26.08	PID settings	0.1%
1A09H	P26.09	PID feedback	0.1%
1A0AH	P26.10	Output speed	1RPM
1A0BH	P26.11	DI input status	
1A0CH	P26.12	DO output status	
1A0DH	P26.13	AI1 input	0.01V
1A0EH	P26.14	AI2 input	0.01V
1A0FH	P26.15	AI3 input	0.01V
1A10H	P26.16	AO1 output	0.01V
1A11H	P26.17	AO2output	0.01V
1A12H	P26.18	Reserved	
1A13H	P26.19	PULSE-IN input pulse frequency	0.01kHz
1A14H	P26.20	PULSE-OUT output pulse frequency	0.01kHz
1A15H	P26.21	Count value	1
1A16H	P26.22	Reserved	
1A17H	P26.23	Feedback length	1
1A18H	P26.24	Load speed display	1RPM
1A19H	P26.25	PLC stage	1
1A1AH	P26.26	Frequency source A	0.01Hz
1A1BH	P26.27	Frequency source B	0.01Hz
1A1CH	P26.28	Output synchronous frequency	
1A1DH	P26.29	Linear speed	1
1A1EH	P26.30	Current running time	1Min
1A1FH	P26.31	Current power-on time	1Min
1A20H	P26.32	Accumulative running time	1h
1A21H	P26.33	Accumulative power-on time	1h
1A22H	P26.34	Produce code	1
1A23H	P26.35	Software version No. of drive	1
1A24H	P26.36	Rated power of inverter	0.1Kw
1A25H	P26.37	Rated voltage of inverter	1V

1A26H	P26.38	Rated current of inverter	0.1A
1A27H	P26.39	Module temperature 1	0.1°C
1A28H	P26.40	Module temperature 2	0.1°C
1A29H	P26.41	Software version No. of operation panel	1

3）Description of operation control, inverter’ s status and fault:

Address	Function description	Data description	R/W
6000H	Communication control	0001H：Forward run 0002H：Reverse run 0003H：Forward jog 0004H：Reverse jog 0005H：Coast to stop 0006H：Decelerate to stop 0007H：Fault reset	R/W
6001H	Inverter’ s status	0001H：Forward run 0002H：Reverse run 0003H：Forward jog 0004H：Reverse jog 0005H：Standby 0006H：Fault	R
6002H	Current fault code	Return to 0 when no fault; Return to the current fault code whnne fault occurs	R
6003H	Fault	Read the current fault of 1 to 10 words	R
	No fault	Read the last one fault of 1 to 10 words	R
6004H	Fault	Read the last one fault of 1 to 10 words	R
	No fault	Read the last two fault of 1 to 10 words	R
6005H	Fault	Read the last two fault of 1 to 10 words	R
	No fault	Read the last three fault of 1 to 10 words	R
6006H	Fault	Read the last three fault of 1 to 10 words	R
	No fault	Read the last four fault of 1 to 10 words	R

The fault address of inverter 6003H~6006H is same to the setting of P13. 30 (0~3). The fault information of the number of words read in each address corresponds to the fault in Group P13. For details, refer to the following table. When reading the fault code, running frequency, output current and bus voltage at fault, the starting address of communication is written into 6003H and the number of word is written into 0004H.

Function code	Parameter address	Notes
1st word	P13.31	Fault code
2nd word	P13.32	Running frequency at fault
3rd word	P13.33	Current at fault
4th word	P13.34	Bus voltage at fault
5th word	P13.35	Output voltage at fault
6th word	P13.36	Input terminal status at fault
7th word	P13.37	Output terminal status at fault
8th word	P13.38	Module temperature
9th word	P13.39	Accumulative running time at fault (hour)
10th word	P13.40	Accumulative running time at fault (second)

4）Communication setting operation:

Address	Function description	Data description	R/W
9000H	Set frequency	0~ Max. output frequency	R/W
9001H	Frequency upper limit	0~ Max. output frequency	R/W
9002H	Motor 1 speed control torque limit	0.0%~200.0%	R/W
9003H	Motor 1 torque control torque	0.0%~200.0%	R/W
9004H	Motor 1 V/F sepration voltage	0.0%~100.0%	R/W

9005H	PID command source	0.0%~100.0%	R/W
9006H	PID feedback source	0.0%~100.0%	R/W
9007H	Multi-reference 0 command	0.0%~100.0%	R/W
9008H	Motor 2 speed control torque limit	0.0%~200.0%	R/W
9009H	Motor 2 torque control torque	0.0%~200.0%	R/W
900AH	Motor 2 V/F sepration voltage	0.0%~100.0%	R/W
900BH	Communication setting DO1, HDO1, T1 terminal output	bit0-DO1 digital output bit1- HDO1 digital output bit2-T1 digital output	R/W
900CH	Communication AO1 output setting	0.0%~100.0%	R/W
900DH	Communication AO2 output setting	0.0%~100.0%	R/W
900EH	High-speed pulase (HDO1) output	0.0%~100.0%	R/W

5）Description of password check and system lock:

Address	Function description	Data description	R/W
A000H	Password check	Enter the correct password.	W
A001H	System lock	Enter 0x01 to lock the system. When the system is locked, it is not allowed to read and write to the basic parameter of group P00-P22, but the other address parameters and the status monitoring parameters can still be accessed. But the premise is to set the user password in advance.(You cannot lock the system without setting the	W

6）Communication fault：

Address	Function description	Data description
83H	Error occus when reading data	1: Wrong password. Enter the incorrect password when unlocking. 2: Read-wirte command error. The command code is not 03H or 06H. 3: CRC check error. Check the verification value. 4: Invalid address. Address and function code do not correspond or not within the specified range. 5: Invalid parameter. The parameter is not within the specified range. 6: The data length of read-write is not within the specified range. 7: Invalid parameter modification. Check if you change the parameters while the inverter is running or the parameters are read-only. 8: System lock. Only A000H can be operated after system locked. 9: Storing parameters to avoid modifying parameters when the parameters are initialized
86H	Error occus when writing data	
90H	Error occus when writing data	

Some paramerters cannot be modified while the inverter is running. The reserved parameters cannot be read or written into. When the communication returns an error, the specific error can be determined by the return data.

Example: Change the motor operation mode （P00. 00）to vector control while the inverter is running.

RTU master command:

START	T1-T2-T3-T4
ADDR	01H
CMD	06H
Writing data address high bits	00H
Writing data address low bits	00H
Parameter high bits	00H

Parameter low bits	01H
CRC CHK low bits	48H
CRC CHK high bits	0AH
END	T1-T2-T3-T4

RTU slave response:

START	T1-T2-T3-T4
ADDR	01H
CMD	86H
Parameter high bits	00H
Parameter low bits	07H
CRC CHK low bits	A1H
CRC CHK high bits	F3H
END	T1-T2-T3-T4

From the RTU slave response data, we can see that the communication error occurs when writing data from host computer to the slave and the the error is that the parameter cannot be modified while the inverter is running.

Version information

Date	Version	Change
July, 2017	V1.0	The first edition
December, 2017	V2.0	Add and modify some information