High Performance Vector Inverter

User Manual

(320 series)

Please carefully read this manual before installing/debugging/using this product!

(V 1.0)

Preface

Thank you for choosing 320 Series inverter (hereinafter referred to as inverter). This product is a full-featured and high-performed vector inverter of a new generation, which is researched, developed and produced independently by our company. It integrates various specialized needs for industry and individual needs for clients. It will try best to meet your needs in various occasions.

This product meets national standard of GB/T12668-2002 and has passed detection test made by National Center for Quality Supervision and Test of Electrical Control and Distribution Equipment as well as certification of ISO9001: 2008 international quality system.

This manual has illustrated relevant matters as users' installation and wiring, parameter setting, operation and running, fault diagnosis, trouble shooting and daily maintenance, etc. In order to ensure the right operation of the inverter in this series and make good use of its excellent performances, please carefully read this manual before installing this converter and keep it at hand or give it to the user of this converter.

If you have any questions or special requirements on the application of this inverter, please contact offices or agencies of our company, and after-sale service center of headquarter at any time. We will serve you with all sincerity.

Please carefully ensure the following matters while opening the box:

1. If this product has been damaged or bumped and whether the components are damaged or fell off;

2. If the rated values on nameplate are consistent with your requirements when you place this order;

3. If packing list is not consistent with your ordering data or there is any problem on this product, please contact offices or agencies of our company at any time. And please explain product model, specification, product code, purchasing date and degree of damage, etc. to help us solve your problems as soon as possible.

Contents

1. Matters Need Attention

In order to keep you, your equipment and properties safe, please carefully read the matters illustrated in this chapter before using this inverter and comply with them in transportation, installation, running, debugging and troubleshooting.

1.1 Definition of safety marks

Dangerous: This signal indicates that if do not operate accordingly, it may lead to death, serious injury or heavy losses of property.

Attention: This signal indicates that if do not operate accordingly, it may lead to personal injury or equipment damage.

Tips: This signal indicates some matters needed attention and some useful information.

1.2 Matters need attention for installation

1.2.1 Dangerous

1.2.1.1 Wiring shall be conducted by technicians with professional qualification to avoid electric shock.

1.2.1.2 Dismount and retrofit inverter privately is prohibited, otherwise it may lead to serious consequences.

1.2.1.3 Please fix the inverter on incombustible objects like metal to avoid catching fire.

1.2.1.4 Please do not fix inverter in inflammable and explosive environment, or else it may have danger of explosion.

1.2.1.5 Before powering on, please cover the plate of inverter. With power on, please don't open the plate or wire, or else it has dangers of electric shock and explosion.

1.2.1.6 It is strictly prohibited to leave metals like wires or screws in the machine, or else it has dangers of explosion and fire.

1.2.1.7 With power on, please do not touch terminals with hands or operate inverter with wet hands, or else it has danger of electric shock.

1.2.1.8 With frequency powers on, wiring operation can be conducted only ten minutes after cutting off power supply and all the indicator lights on panel are off, the

1.3.8 Before the first use or reuse after being placed for a longtime, please make insulation inspection on motor (make sure that insulation resistance measured is not less than 5MΩ) to avoid damaging inverter because of insulation failure.

1.3.9 As output U, V, W voltage waveform of inverter is PMW Wave, if capacitance for improving power factor or voltage dependent resistor for lightning protection is installed at the output end, inverter will fail or parts of it will be damaged. Then it must be removed. Diagram of capacitor prohibited at output end of inverter is as the following Diagram 1-2:

1.3.10 If switching devices as contactor are needed to be fixed between output of inverter and motor, please make sure that make-break operation is conducted when inverter is of no output, or else the inverter may be damaged.

1.3.11 This inverter is not suitable to be used beyond working voltage. If it is needed, relevant voltage boosting device and voltage dropping device shall be used to transform voltage.

1.3.12 In the region higher than 1,000 meters above sea level, for the low cooling efficiency of inverter caused by rarefied air, it shall be used through derating. Application relationship between rated output current of inverter and derating of altitude is showed in following Diagram 1-3.

1.3.13

2.Technical Parameters and Index

2.1 Model and its signification

Voltage	One-phase 220V	Three-phase 220V(240V)	380V(415V)	460V(440V)
Power (KW)	Current (A)	Current (A)	Current (A)	Current (A)
0.4	2.5	2.5	-	-
0.75	4	4	2.5	2.5
1.5	7	7	3.7	3.7
2.2	10	10	5	5
4	16	16	9	8
5.5	20	20	13	11
7.5	30	30	16	15
11	42	42	25	22
15	55	55	32	27
18.5	-	70	38	34

Voltage	One-phase	Three-phase		
	220V	220V(240V)	380V(415V)	460V(440V)
Power (KW)	Current (A)	Current (A)	Current (A)	Current (A)
22	-	80	45	40
30	-	110	60	55
37	-	130	75	65
45	-	160	90	80
55	-	200	110	100
75	-	260	150	130
93	-	320	170	147
110	-	380	210	180
132	-	420	250	216
160	-	550	300	259
185	-	600	340	300
200	-	660	380	328
220	-	720	415	358
250	-	-	470	400
280	-	-	520	449
315	-	-	600	516
355	-	-	640	570
400	-	-	750	650
500	-	-	920	800

2.3 Instructions on technical index

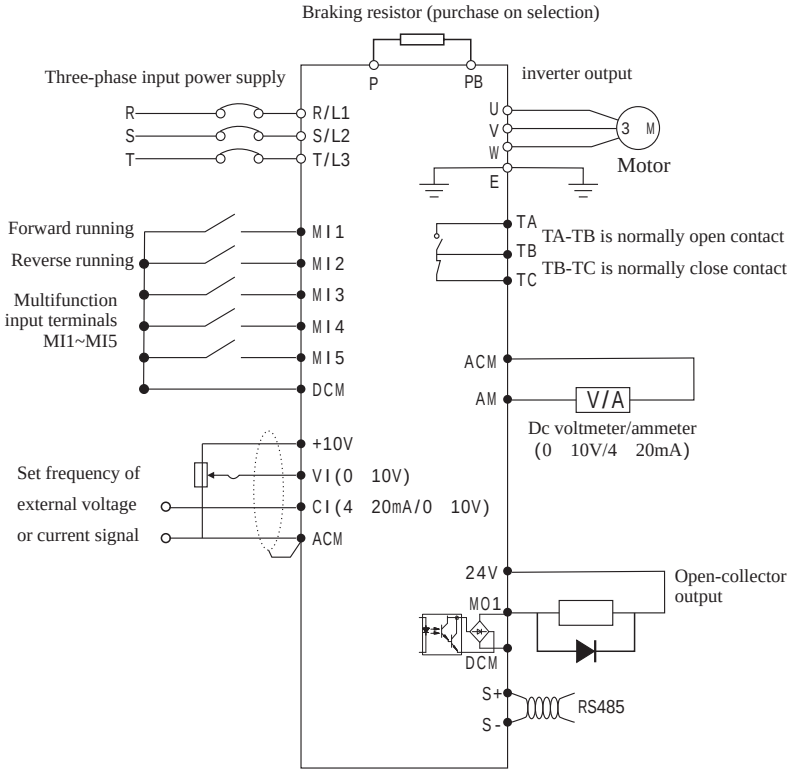
Input	Rated voltage and frequency		One-phase 220V, three-phase 380 V; 50/60Hz
	Change allowed range of voltage		One-phase 175V~280V; three-phase 305V~480V; voltage unbalance rate<3%;
Output	Voltage		Three-phase 0~220V, 0~380V
	Frequency		0Hz~600Hz
	Overload capacity		Series G: rated current × 150% / 1minute, × 180% / 2seconds; Series P: rated current × 120% / 1minute, × 150% / 2seconds; Heavy duty Z: rated current × 110% longtime, × 180% / 3minutes;
Controlling characteristics	Control method		V/F control (optimized SVPWM with the characteristic of optimized low-frequency dead-time compensation)
	Resolution of frequency setting	Simulation setting	0.1% of maximum output frequency
		Digital setting	0.01Hz
		Panel simulation setting	0.4% of maximum frequency
		External pulse	0.1% of maximum frequency
	Channel of frequency setting		Setting of penal potentiometer; setting of [▲] and [▼] on panel; setting of digitals on panel; setting of Port RS485; increasing and decreasing setting of terminal UP/DOWN; setting of analog voltage (DC/0 10V); setting of analog current (CI/4~20mA); setting of pulse (0~20KHz); combination setting; it allows switching between these setting methods at any time.
	Frequency accuracy	Simulation setting	± 0.2% of maximum output frequency
		Digital setting	± 0.01% of given output frequency
		External pulse setting	± 0.1% of maximum output frequency
	V/F Curve (frequency characteristics of voltage)		Reference frequency can be set freely 5~500Hz and five curves can be chosen from: 1. Characteristic curve with constant torque 2. Characteristic curve with three reduced torques (2.0power, 1.7power and 1.2power) 3. Multistage V/F Curve defined by user
	Torque boost	Manual setting	0.1%~ 30% of rated output
		Auto-raise	Raising torque is confirmed automatically with output current

Controlling characteristics	Setting of accelerating and decelerating	Two methods: accelerate and decelerate as straight line, accelerate and decelerate as curve; seven types of time for accelerating and decelerating with unit of time can be chosen from (minute/second); it can be set successively 0.1s~6,000m.
	DC braking	It can be chosen when start or stop respectively, motion frequency 0~15Hz, braking current X (0~80%), with starting time of 0~60s or durative actions.
	Startup signal	It can be chosen from signals of forward signal, reversal signal and startup signal (triliner control)
	Operation with automatic energy-saving	Optimize V/F Curve automatically according to condition of loading so as to realize energy-saving operation.
	Automatic current limiting function	It is equipped with the ability of current self-restraint to avoid breakdown frequent over-current in the process of accelerating and decelerating as well as under impacting load
	Automatic voltage regulation (AVR)	When network voltage changes, it can be adjusted and maintained automatically to keep output voltage constant
	Prevention of voltage stall	Guarantee that overvoltage will not happen in the process of decelerating.
	Carrier adjustment of motor noise	Carrier frequency 1.0KHz~ 15.0KHz is successive and adjustable, which will reduce motor noises the most.
	Timer and counter	It build-in a timer and a counter, which helps to integrate system
	Function of multi-velocity control	It has seven stages of programmable multi-velocity control with running direction and running time of each stage can be set. When it is controlled by external terminals, speed can reach 15, which involves 6 operation modes including pendulous frequency operation.
	Pendulous frequency operation	It is of abundant pendulous frequency parameters, which helps to measure and set online data like center frequency, pendulous frequency amplitude and length, etc, so as to realize multi-machine interaction operation.
	Built-in PID control	It helps to make a simple closed-loop control system with no PID controller.

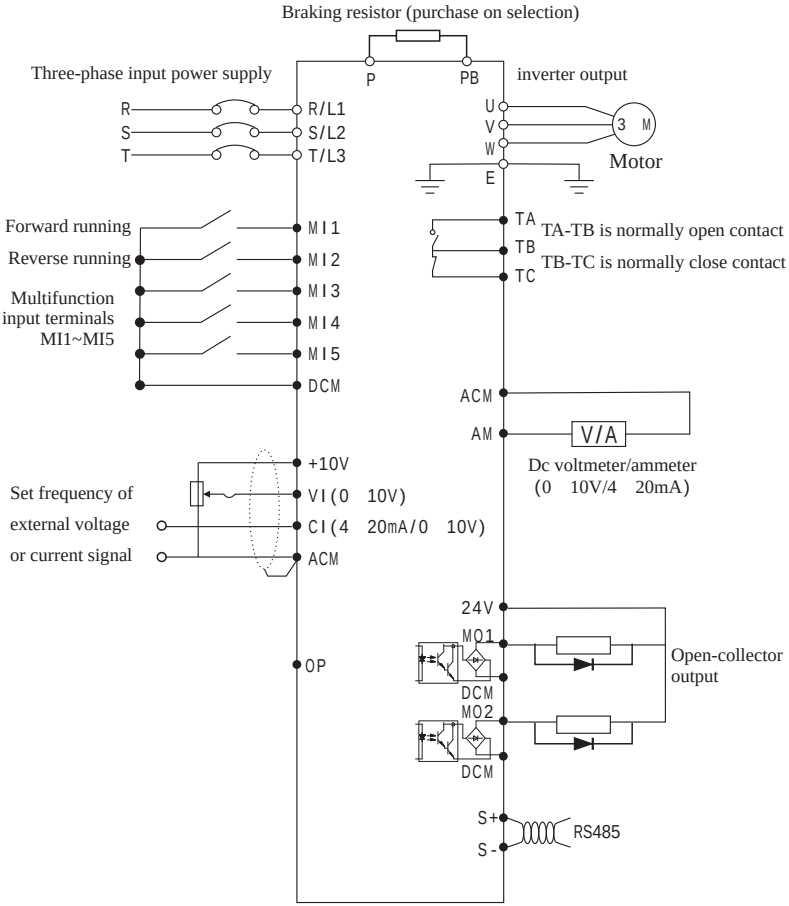
	Operation function		Setting of upper limiting frequency and lower limiting frequency, hopping motion of frequency, limit of reverse running, compensation of slip frequency, operation with stable voltage automatically, RS485 communications, control of frequency increasing and decreasing and self-recovery from fault.
Controlling characteristics	Output signal	Running status (M01 output)	inverter is running, arrival of frequency, level detection of frequency, alarm of overloading, stop running with external fault, reach upper-frequency limit, reach lower-frequency limit, stop with inadequate voltage, run with no speed, programmable multi-velocity status, reach internal counter, reach internal timer, upper and lower pressure limit alarm.
		Indicator	Output frequency, output current, output voltage, motor rotating speed, PID setting and feedback and be able to connect with voltmeter and frequency meter outside.
Display	Operation panel display	Running status	Output frequency, output current, output voltage, motor rotating speed, frequency setting, PID setting, PID feedback, module temperature, total of running time, analog input and output, and input status of terminals, etc.
		Warning contents	With failure logging of latest six times and operation parameters like output frequency, set frequency, output current, output voltage, DC bus voltage, module temperature of latest tripping operation.
Protection/warning function			Over-current, over-voltage, under-voltage, protection of electronic thermal relay, overheating, short circuit and over-loading.
Environment	Ambient temperature		From -10 to 50 (no freezing) (when the temperature is 40 -50 , we suggest to derate)
	Ambient humidity		Under 90% (no frosting)
	Surroundings		Indoor (with no direct sunlight, corrosion, inflammable gas, oil mist, vapor and water drops, etc)
	Elevation		

3. Installation and Wiring

3.1 Basic wiring diagram of major loop

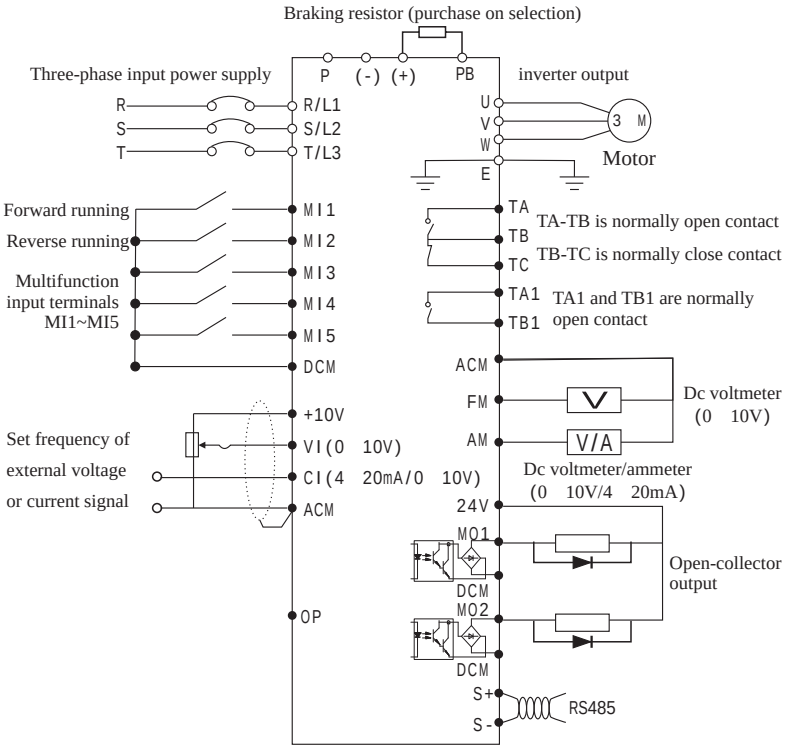


0.75-2.2KW Basic wiring diagram



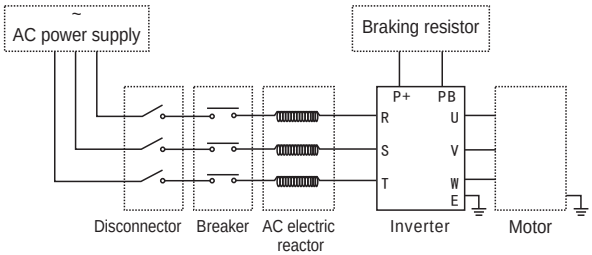
4-7.5KW Basic wiring diagram

Notation: 320S se 0 n

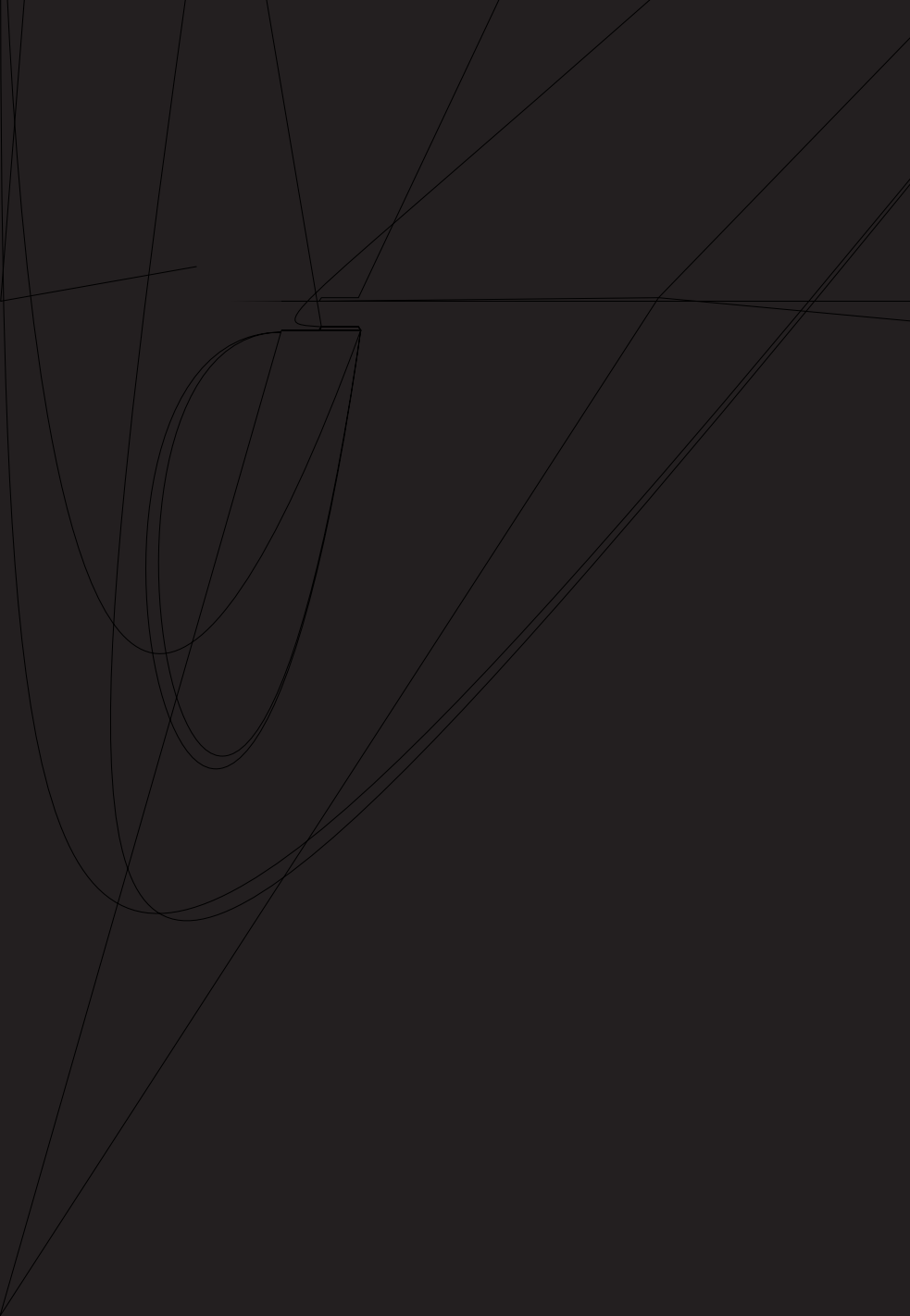


Above 11KW Basic wiring diagram

3.2 Recommendation of systematic wiring diagram



Simple systematic wiring diagram



Voltage (V)	Power (KW)	Specification of braking resistor		Braking torque 10%ED
		W	Ω	
One-phase 220 series	0.4	80	200	125
	0.75	100	200	125
	1.5	300	100	125
	2.2	300	70	125
	3.7	300	50	125
Three-phase 380 series	0.75	80	750	125
	1.5	300	400	125
	2.2	300	250	125
	4	400	150	125
	5.5	500	100	125
	7.5			

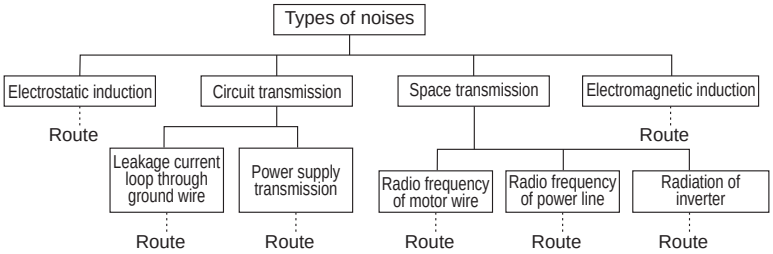
3.4 About interferences

Output of inverter is PWM wave, which will generate some noises while running. In order to reduce interferences that inverter brings to others, installation methods below can be referred.

3.4.1 Restraint of noise

(1) Type of noises

Degree of the influence on other devices made by the noises generated by inverter while working is related to various factors like controlling system of inverter, anti-interference ability and wiring condition of the device, safe distance and grounding method, etc. Types of noises include: electrostatic induction, circuit transmission, space transmission, electromagnetic induction and so on.



Noises types in multi-machine communication of inverter

(2) Basic countermeasures to prevent noises

Chart of Countermeasures to Prevent Interferences

Noises transmission route	Countermeasures to reduce influence
	When ground wire of peripheral equipment forms a closed loop with wirings of inverter, ground wire of inverter will leak current, which leads to malfunction of equipment. At this time, if the equipment is not grounding, malfunction will be added more.
	When peripheral equipment shares the same system with power supply of inverter, the noises will transmit backward the power line, which interferes other devices of the same system. Preventing measures can be adopted as follows: install an electromagnetic noise filter at input end of inverter, in order to isolate it from other devices.
	(1) Devices and signal lines that are easy to be interfered shall keep a distance from inverter. Adopt shielded line as signal line, with shielding layer grounded with single-end and try to keep a distance from inverter and its input line as well as output line. If signal line must be intersected with strong current cable, they should be orthogonal.

3.4.2 Field wiring and grounding

(1) Cable (outgoing line of terminals U, V and W) from inverter to motor shall avoid being parallel with power line (input line of terminals R, S and T or R and T). If they must be paralleled, it must keep a distance of more than 30cm.

(2) Try to

4.1.2 Key Function Description

KeyName	Name	Function Description
PRGM	Programming key	Enter or exit of menu, parameter modification.
ENTER	Data enter key	Progressively enter menu and confirm parameter.
▲	UP increase key	Progressively increase data or function codes.
▼	DOWN decrease key	Progressively decrease data or function codes.
<<	Shift key	The selection of parameter modification and display content.
RUN	Run key	Start to run the inverter in keypad control mode.
STOP/RESET	Stop/reset key	To stop/reset operation, limited by function code F7-02.
REV/JOG	Shortcut key	Determined by function code F7-01.

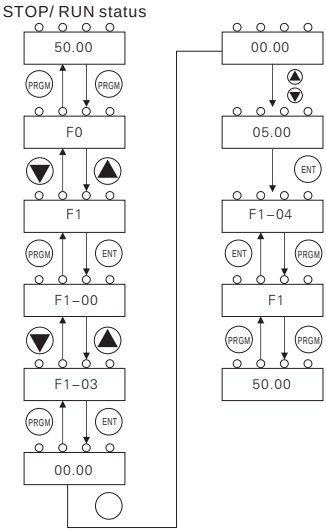
4.1.3 Indicator Light Description

Indicator light name	Description
FWD	Forward operation status
REV	Reverse operation status
STOP	Stop status
ALM	Malfunction status

4.2 Operation Process

The monitoring operation of the first group LED digital display on the dual-display keyboard is same with the operation of the single display keyboard. The second group LED digital display mainly used to monitor the parameters of F7-08. With the factory default value of 04, it would mainly monitors the runni #Ė Wi parameters F7-08 [illegible] of it t@le

For example: change the parameter 00.00Hz of function code F1-03 into 05.00 Hz as the following flow chart shows:



Flow Chart of Parameter Setting

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

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

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

4.2.2 Fault Reset

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

4.2.3 Motor Parameter Autotuning

When select SVC control mode (vector control without PG card), make sure that motor nameplate parameter is correctly input into the inverter. Inverter will match standard motor parameter according to nameplate parameter. In order to achieve precise control, autotuning is necessary. Refer to the following steps:

Firstly, set the parameter of F0-02 to 0. This means select the keypad to control stop or start.Then input the following parameters according to the actual motor Parameters:

F2-01: Motor rated power

F2-02: Motor rated frequency

F2-03: Motor rated speed

F2-04: Motor rated voltage

F2-05: Motor rated current

If motor can be uncoupled with its load completely, set the parameter of F2-11 to 2 (complete tuning) and then push RUN , inverter can calculate the parameter of motor. During autotuning process, the panel of inverter will display RUN, When it displays END the autotuning process is finished.

If motor cannot be uncoupled with its load, set the parameter of F2-11 to 1 (static tuning) and then push RUN , inverter will auto-detect the parameters of motor stator resistor, rotator resistor and leakage inductance, while the parameters of motor mutual inductance and no-load current are not detected.

The parameters of motor mutual inductance and no-load current can be calculated by the following formula:

$$I0 = I \times \sqrt{1 - \eta^2}$$

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

I 0 for no-load current, Lm for mutual inductance, L δ for leakage inductance.

4.2.4 Password Setting

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

NOTE: When the inverter is powered on, system will execute initialization first and inverter panel displays J-320 with four lights on. After initialization, inverter accesses into stand-by status.

5. List of Functional Parameters

Here is the description for the symbols used in the functional parameter table:

“ ”: It indicates that the setting value of the parameter can be modified when the inverter is in stop status or running status.

“ ”: It indicates that setting value of the parameter cannot be modified when the inverter is under the running status.

“ ● ”: It indicates that the numerical value of the parameter is actually measured value, which cannot be modified.

“ * ”: It indicates this parameter is “Factory Default Parameter” and can only be set by the manufacturer. The users are prohibited to adjust this parameter.

Function Code	Function Description

Function Code	Function Description	Setting Range	Factory Default Value	Change
F0-07	Frequency Source Overlapping Selection	Single-digit: selection of frequency source 0: Main frequency source X 1: Operation results of main and auxiliary frequency (the operation relationship is determined by tens digit) 2: Switching between main frequency source X and the auxiliary frequency source Y 3: Switching between main frequency source X and the operation results of main and auxiliary frequency 4. Switching between auxiliary frequency source Y and the operation results of main and auxiliary frequency Tens Digit: Operation relation between main frequency source and auxiliary frequency source 0: main plus auxiliary 1: main minus auxiliary 2: Maximum value between the main and the auxiliary 3: Minimum value between the main and the auxiliary	00	☆
F0-08	Pre-placing Frequency	0.00Hz-Maximum Frequency (F0-10)	50.00Hz	☆
F0-09	Running Direction	0: Direction is consistent 1: Direction is reverse	0	☆
F0-10	Maximum Frequency	50.00Hz-600.00Hz	50.00Hz	★
F0-11	Frequency Source Upper Limit	0: F0-12 Setting 1: VI 2: CI 3: Reserved 4: Reserved 5: Commuication Setup	0	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F0-17	Acceleration Time 1	0.00s-65000s	Model Dependent	☆
F0-18	Deceleration Time1	0.00s-65000s	Model Dependent	☆
F0-19	Time Unit of Acceleration and Deceleration	0: 1 second 1: 0.1 second 2: 0.01 second	1	★
F0-20	Reserved			
F0-21	Offset Frequency of Auxiliary Frequency Source During Overlapping	0.00Hz-Upper Limit Frequency F0-10	0.00Hz	
F0-22	Frequency Command Resolution	1: 0.1Hz 2: 0.01Hz	2	
F0-23	Digital Setting Frequency Shutting Down Memory Selection	0: No Momory 1: With Memory	0	
F0-24	Benchmark Frequency of Acceleration Time	0: Maximum Frequency (F0-10) 1: Setting Frequency 2: 100Hz	0	
F0-25	Frequency Command UP/DOWN Benchmark during Running	0: Running Frequency 1: Setting Frequency	0	
F0-26	Command Source Bonding with Frequency SOurce	Single-digit: Operation Panel Command Binding with Frequency Source Selection 0: No binding 1: Panel Potentiometer Speed Adjustment 2: VI 3: CI 4: Reserved 5: Reserved 6: MS Speed 7: Simple PLC 8: PID 9: Communication Setting Tens Digital: Terminal Command binding with Frequency Source Selection Hundreds Digital: Communication Command binding with Frequency Source Selection Thousand Digital: Automatic Running binding with Frequency Source Selection		

Function Code	Function Description	Setting Range	Factory Default Value	Change
F1 Group: Start-up and Shut-down Parameters				
F1-00	Start-up Method	0: Direct Start-up 1: Re-startup of rotate speed tracking 2: Pre-field Enable (alternate electrical asynchronous motor)	0	
F1-01	Rotate Speed Tracking Method	0: Starting from Shut-down Frequency 1: Starting from Zero 2: Starting from Maximum Frequency	0	
F1-02	Speed of Rotate Speed Tracking	1-100	20	
F1-03	Start-up Frequency	0.00Hz-10.00Hz	0.00Hz	
F1-04	Retention Time of Start-up Frequency	0.0s-100.0s	0.0s	
F1-05	Starting DC Braking Current /Prelimary Exciting Current	0%-100%	0%	
F1-06	Starting DC Braking Time / Prelimary Exciting Time	0.0s-100.0s	0.0s	
F1-07	Accelerating and Decelerating Method	0: Direct Line Acceleration and Deceleration 1: S Curve Acceleration and Deceleratio A 2: S Curve Acceleration and Deceleratio B	0	
F1-08	Time Scale of the Starting Section of the S Curve	0.0%-(100.0%-F6-09)	30.0%	
F1-09	Time Scale of the Ending Section of the S Curve	0.0%-(100.0%-F6-08)	30.0%	
F1-10	Shut-down Method	0: Slowing Down Shut-down 1: Free Shut-down	0	
F1-11	Starting Frequency of the DC Braking for Shut-down	0.00Hz-Upper Limit Frequency	0.00Hz	
F1-12	Waiting Time of DC Braking for Shut-down	0.0s-100.0s	0.0s	
F1-13	DC Braking Current for Shut-down	0%-100%	0%	
F1-14	DC Braking Time for Shut-down	0.0s-100.0s	0.0s	
F1-15	Braking Utiliztion Rate	0%-100%	100%	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F2 Group: Motor Parameter Group				
F2-00	Selection of Motor Type	0: 3-Phase Asynchronous Motor 1: Variab M % q - dz		

Function Code	Function Description	Setting Range	Factory Default Value	Change
F3 Group: Vector Control Parameter Group				
F3-00	Speed Loop Proportional Gain 1	1-100	30	
F3-01	Speed Loop Integration Time 1	0.01s-10.00s	0.50s	
F3-02	Switching Frequency 1	0.00-F3-05	5.00Hz	
F3-03	Speed Loop Proportional Gain 2	1-100	20	
F3-04	Speed Loop Integration Time 2	0.01s-10.00s	1.00s	
F3-05	Switching Frequency 2	F3-02-Maximum Frequency	10.00Hz	
F3-06	Slip Gain of Vector Control	50%-200%	100%	
F3-07	Filter time constant of Speed Loop	0.000s-0.100s	0.000s	
F3-08	Over-excitation Gains of Vector Control	0-200	64	
F3-09	Upper limit source of torque under the speed control mode	0: Function Code F2-10 Setting 1: VI 2: CI 3: Reserved 4: Reserved 5: Communication Setting 6: MIN(VI,CI) 7: MAX(VI,CI) The full span of the item 1-7 corrospond with F2-10	0	
F3-10	Digitial setting of the upper limit for torque under speed control mode	0.0%-200.0%	150.0%	
F3-11	Reserved			
F3-12	Reserved			
F3-13	Proportional gain of excitation adjustment	0-60000	2000	
F3-14	Integration gains of excitation adjustment	0-60000	1300	
F3-15	Proportional gains of torque adjustment	0-60000	2000	
F3-16	Integration gains of torque adjustment	0-60000	1300	
F3-17	Integration property of speed loop	Single-digit: Integration Separation 0: Inactive 1: Active	0	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F4 Group: V/F Control Parameter Group				
F4-00	VF Curve Setting	0: Straight line V/F 1: Multi-point V/F 2: Square V/F 3: Power 1.2 V/F 4: Power 1.4 V/F 6: Power 1.6 V/F 8: Power 1.8 V/F 9: Reserved 10: VF complete separation mode 11: VF Semi-separation mode	0	
F4-01	Torque Boost	0.0: (automatic) 0.1% to 30.0%	Model Dependent	
F4-02	Torque Boost Cut-off Frequency	0.00Hz-Maximum Frequency	50.00Hz	
F4-03	Multi-point VF Frequency Point 1	0.00Hz-F3-05	0.00Hz	
F4-04	Multi-point VF Voltage Point 1	0.0%-100.0%	0.0%	
F4-05	Multi-point VF Frequency Point 2	F3-03-F3-07	0.00Hz	
F4-06	Multi-point VF Voltage Point 2	0.0%-100.0%	0.0%	
F4-07	Multi-point VF Frequency Point 3	F3-05-Rated Frequency of Motor (F1-04)	0.00Hz	
F4-08	Multi-point VF Voltage Point 3	0.0%-100.0%	0.0%	
F4-09	VF Slip Compensation Gain	0.0%-200.0%	0.0%	
F4-10	VF Over-excitation Gain	0-200	64	
F4-11	VF Oscillation Suppression Gain	0-100	Model Dependent	
F4-12	Reserved			
F4-13	Voltage Source Separated from the VF	0: Digitial Setting (F3-14) 1: VI 2: CI 3: Reserved 4: Reserved 5: MS Command 6: Simple PLC 7: PID 8: Communication Setting Note: 100.0% relative to the rated voltage	0	
F4-14	Digital Setting of the Voltage Separated from VF	0V-Rated Voltage of Motor	0V	
F4-15	Ascending Time of the Voltage Separated from VF	0.0s-1000.0s Note: indicate the time from 3V to rated voltage of the motor	0.0s	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F5 Group: Input Terminal Parameter Group				
F5-00	MI1 Terminal Function Selection	0: No Function 1: Forward Running (FWD) 2: Reversed Running (REV) 3: Three-line Mode Running Control 4: Forward Rotation Jog (FJOG) 5: Reverse Rotation Jog (RJOG) 6: Terminal UP 7: Terminal DOWN 8: Coast to stop 9: Fault Reset (RESET) 10: Pause 11: External Fault Normal Open Input 12: MS Command Terminal 1 13: MS Command Terminal 2 14: MS Command Terminal 3 15: MS Command Terminal 4 16: Speed-up and Speed-down Time Selection Terminal 1 17: Speed-up and Speed-down Time Selection Terminal 2 18: Switching of Frequency Sources 19: UP/DOWN Setup Clear (Terminal, Keyboard) 20: Running Command Switching Terminal 21: Acceleration/deceleration inactive 22: PID Pause 23: PLC Status Reset 24: Swing Frequency Pause 25: Counter Input 26: Counter Reset 27: Length Count Input 28: Length Reset 29: Torque Control Inactive 30~31: Reserved 32: Instant Direct Current Braking 33: Normal Cloed Input for External Fault 34: Frequency Change Enable 35: PID Function Direction Reversed Selection 36: External Shut-down Terminal 1 37: Controlling Command Switching Terminal 2 38: PID Integration Pause 39: Switching between Frequency Source X and Presetting Frequency 40: Switching between Frequency Source Y and Presetting Frequency 41~42: Reserved 43: PID Parameter Switching 44~45: Reserved 46: Speed Control /Torque Control Switching 47: Emergency Shut-down 48: External Shut-doiwn Terminal 2 49: Speed-down DC Braking 50: Current Running Time Clear 51~59:Reserved	1	
F5-01	MI2 Terminal Function Selection		2	
F5-02	MI3 Terminal Function Selection		9	
F5-03	MI4 Terminal Function Selection		12	
F5-04	MI5 Terminal Function Selection		13	
F5-05	Reserved			
F5-06	Reserved			
F5-07	Reserved			
F5-08	Reserved			
F5-09	Reserved			

Function Code	Function Description	Setting Range	Factory Default Value	Change
F5-10	Min Filter Time	0.000s-1.000s	0.010s	
F5-11	Terminal Command Method	0. Two-line mode 1 1. Two-line mode 2 2. Three-line mode 1 3. Three-line mode 2	0	
F5-12	Terminal UP/DOWN Change Rate	0.001Hz/s-65.535Hz/s	1.00Hz/s	
F5-13	VI Lower Limit	0.00V-10.00V	0.00V	
F5-14	Corrosponding Setting for VI Lower Limit	-100.0%-100.0%	0.0%	
F5-15	VI Upper Limit	0.00-10.00V	10.00V	
F5-16	Corrosponding Setting for VI Upper Limit	-100.0%-100.0%	100.0%	
F5-17	VI Wave Filter Time	0.00s-10.00s	0.10s	
F5-18	CI Lower Limit Value	0.00V-10.00V	0.00V	
F5-19	CI Lower Limit Relative Setting	-100.0%-100.0%	0.0%	
F5-20	CI Upper Limit	0.00-10.00V	10.00V	
F5-21	CI Upper Limit Relative Setting	-100.0%-100.0%	100.0%	
F5-22	CI Filter Time	0.00s-10.00s	0.10s	
F5-23 ~F5-56	Reserved			
F5-57	MI1 Delay Time	0.0s-3600.0s	0.0s	
F5-58	MI2 Delay Time	0.0s-3600.0s	0.0s	
F5-59	MI3 Delay Time	0.0s-3600.0s	0.0s	
F5-60	Min Terminal Valid Mode Selection 1	0: High voltage level is active 1: Low voltage level is active Single-digit: MI1 Tens Digit: MI2 Hundreds Digit: MI3 Thousands Digit: MI4 Ten Thousands Digit: MI5	00000	
F5-61	Reserved			

Function Code	Function Description	Setting Range	Factory Default Value	Change
F6 Group: Output Terminal Parameter Group				
F6-00	Reserved			
F6-01	MO1 Function Selection (Open Collector Output Terminal)	0: No output 1: Inverter Is Running 2: Fault Output (Fault Shut-down) 3: Frequency Level Detection FDT1 Output 4: Frequency Arrival 5: In Zero Speed Operation (No Output after Shut-down) 6: Motor Over-load Pre-warning 7: Inverter Overload Pre-warning 8: Setup Counting Value Arrival 9: Designated Counting Value Arrival 10: Length Arrival 11: PLC Circulation Completion 12: Accumulative Running Time Arrival 13: Frequency Limiting 14: Torque Limiting 15: Ready for Running 16: VI>CI 17: Frequency Upper Limit Arrival 18: Frequency Lower Limit Arrival (related with operation) 19: Under Voltage Status Output 20: Comunicaiton Setting 21: Positioning Completed (Reserved) 22: Positioning Completed(Reserved) 23: Zero Speed Running 2 (output during shut-down) 24: Accumulative Power On Time Arrival 25: Frequency Level Detection FDT2 Output 26: Frequency 1 Arrival Output 27: Frequency 2 Arrival Output 28: Current 1 Arrival Output 29: Current 2 Arrival Output 30: Timing Arrival Output 31: VI Input Beyond Limitation 32: Off-loading 33: Reverse runing 34: Zero Current Status 35: Module Temperature Arrival 36: Output current beyond limitation 37: Arrival of lower frequency (stop and output) 38: Alarming output (continue to run) 39: Pre-warning for overheat of motor 40: Current ruuning time arrival	0	
F6-02	Function Selection of Relay 1 (TA, TB, TC)		2	
F6-03	Reserved		0	
F6-04	MO2 Function Selection (Open Collector Output Terminal)		0	
F6-05	(TB1 TA1) Function Selection of Relay 2 (TB1, TA1)		0	

Function Code	Function Description	Setting Range
F6-06	Reserved	0: Running frequency 1: Setting Frequency 2: Output Current 3: Output

Function Code	Function Description	Setting Range	Factory Default Value	Change
F7 Group: Human-computer Interface Parameter Group				
F7-00	User Password	0-65535	0	
F7-01	JOG/REV Key Function Selection	0: Reverse running 1: Switching between the command channel of operation board and the remote command channel (terminal command channel or communication command channel) 2: Swtiching between forward and reverse rotation 3: Forward Jog 4: Reverse Jog	0	
F7-02	STOP/RESET Button Function	0: The shut-down function of STOP/START is only valid under the operation mode of keyboard 1: The shut-down function of STOP/START is valid under all modes	1	
F7-03	LED Running Display Parameter 1	0000-FFFF Bit00: Running Frequency 1(Hz) Bit01: Setting Frequency (Hz) Bit02: Bus Voltage (V) Bit03: Output VOltage (V) Bit04: Output Current (A) Bit05: Output Power (kW) Bit06: Output Torque (%) Bit07: Min Input Status Bit08: MO Output Status Bit09: VI Voltage (V) Bit10: CI Voltage (V) Bit11: Reserved Bit12: Counter Value Bit13: Length Value Bit14: Load Speed Display Bit15: PID Setting	1F	
F7-04	LED Running Display Parameter 2	0000-FFFF Bit00: PID Feedback Bit01: PLC Stage Bit02: Reserved Bit03: Operating Frequency 2 (Hz) Bit04: Residual Running Time Bit05: VI Voltage before Check (V) Bit06: CI Voltage before Check (V) Bit07: Reserved Bit08: Linear Velocity Bit09: Curent Power On Time (Hour) Bit10: Current Running Time (Min) Bit11: Reserved Bit12: Communcaiton Setting Value Bit13: Reserved Bit14: Main Frequency X Display (Hz) Bit15: Auxiliary Frequency Y Display(Hz)	0	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F7-12				

Function Code	Function Description	Setting Range	Factory Default Value	Change
F8-16	Set Accumulative Power On Arriving Time	0h-65000h	0h	
F8-17	Set Accumulative Running Arrival		0h	
F8-18	Start-up	selection 1: Protection	0	
F8-19	Frequen n value (FDT1)	0.00Hz-Rated Current of Motor	50.00Hz	
F8-20	Frequen on Lagging Value (F	0.0%-100.0%(FDT1 Electric Level)	5.0%	
F8-21	Frequen Detection Width	0.0%-100.0%(Rated Current of Motor)	0.0%	
F8-22	Whethe frequen accelera process		0	
F8-23	Reserve			
F8-24	Reserve			
F8-25	Frequen ng Point betweer on time 1 and acc me 2	0.00Hz-Maximum Frequency	0.00Hz	
F8-26	Frequen ng Point betweer on time 1 and acc	0.00Hz-Maximum Frequency	0.00Hz	
F8-27	Termina	1: Active	0	
F8-28	Frequency Detection Value (FDT2)	0.00Hz-Maximum Frequency	50.00Hz	
F8-29	Frequency Detection Lagging Value (FDT2)	0.0%-100.0%(FDT2 Electric Level)	5.0%	
F8-30	Random Arrival Frequency Detection Value 1	0.00Hz-Maximum Frequency	50.00Hz	
F8-31	Random Arrival Frequency Detection Width 1	0.0%-100.0%(Rated Current of Motor)	0.0%	
F8-32	Random Arrival Frequency Detection Value 2	0.00Hz-Maximum Frequency	50.00Hz	
F8-33	Random Arrival Frequency Detection Width 2	0.0%-100.0%(Maximum Frequency)	0.0%	
F8-34	Zero Current Detection Level	0.0%-300.0% 100.0% Relative to Rated Current of Motor	5.0%	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F8-35	Zero Current Detection Delay Time	0.01s-600.00s	0.10s	
F8-36	Above Threshold Value of Output Current	0.0%(No inspection) 0.1%-300.0%(Rated Current of Motor)	200.0%	
F8-37	Output Current Above Threshold Detection Delay Time	0.00s-600.00s	0.00s	
F8-38	Random Arrival Current 1	0.0%-300.0%(Rated Current of Motor)	100.0%	
F8-39	Random Arrival Current 1 Width	0.0%-300.0%(Rated Current of Motor)	0.0%	
F8-40	Random Arrival Current 2	0.0%-300.0%(Rated Current of Motor)	100.0%	
F8-41	Random Arrival Current 2 Width	0.0%-300.0%(Rated Current of Motor)	0.0%	
F8-42	Timing Function Selection	0: Inivalid 1: Valid	0	
F8-43	Timing Operation Time Selection	0: F8-44 Setting 1: VI 2: CI 3: Reserved Analog inpout range cossosponds with F8-44	0	
F8-44	Timing Operaiton Time	0.0Min-6500.0Min	0.0Min	
F8-45	Lower Limit of VI Input Voltage Protection Value	0.00V-F8-46	3.10V	
F8-46	Upper Limit of VI Input Voltage Protection Value	F8-45-10.00V	6.80V	
F8-47	Arrival of Module Temperature	0 -100	75	
F8-48	Reserved			
F8-49	Wake-up Frequency	Standby frequency (F8-51)- Maximum Frequency(F0-10)	0.00Hz	
F8-50	Wake-up Delay Time	0.0s-6500.0s	0.0s	
F8-51	Standby Frequency	0.00Hz- wake-up frequency(F8-49)	0.00Hz	
F8-52	Standby delay time	0.0s-6500.0s	0.0s	
F8-53	Setting for the current running time arrival	0.0Min-6500.0Min	0.0Min	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F9 Group: PID Parameter				
F9-00	PID Reference Source	0: F9-01 Setting 1: VI 2: CI 3: Reserved 4: Reserved 5: Communication Setting 6: MS Command Setting	0	
F9-01	PID Number Setting	0.0%-100.0%	50.0%	
F9-02	PID Feedback Source	0: VI 1: CI 2: Reserved 3: Reserved 4: Reserved 5: Communication Setting 6: VI+CI 7: MAX(|VI|, |CI|) 8: MIN(|VI|, |CI|)	0	
F9-03	PID Function Direction	0: Forward Function 1: Reverse Function	0	
F9-04	PID Reference Feedback Range	0-65535	1000	
F9-05	Proportional Gain Kp1	0.0-100.0	20.0	
F9-06	Integration Time Ti1	0.01s-10.00s	2.00s	
F9-07	Derivatice Time Td1	0.000s-10.000s	0.000s	
F9-08	PID Reverse Ending Frequency	0.00-Maximum Frequency	2.00Hz	
F9-09	PID Deviration Limit	0.0%-100.0%	0.0%	
F9-10	PID Differentation Amplitude Limitation	0.00%-100.00%	0.10%	
F9-11	Changing Tiime for PID Reference	0.00-650.00s	0.00s	
F9-12	PID Feedback Filtering Time	0.00-60.00s	0.00s	
F9-13	PID Output Filtering Time	0.00-60.00s	0.00s	
F9-14	Reserved	-	-	

Function Code	Function Description	Setting Range	Factory Default Value	Change
F9-15	Proportional Gains Kp2	0.0-100.0	20.0	
F9-16	Integration Time Ti2	0.01s-10.00s	2.00s	
F9-17	Derivatice Time Td2	0.000s-10.000s	0.000s	
F9-18	PID Parameter Switching Condition	0: No Switching 1: Switching through Min Terminal 2: Automatic Switching according to Deviation	0	
F9-19	PID Parameter Switching Deviration 1	0.0%-FA-20	20.0%	
F9-20	PID Parameter Switching Deviration 2	FA-19-100.0%	80.0%	
F9-21	Initial Value of PID	0.0%-100.0%	0.0%	
F9-22	Maintainng Time of PID Initial Value	0.00-650.00s	0.00s	
F9-23	Maximum Value on Forward Direction of the Deviation of Two Ouput	0.00%-100.00%	1.00%	
F9-24	Maximum Value on Reverse Direction of the Deviation of Two Ouput	0.00%-100.00%	1.00%	
F9-25	PID Integration Property	Single Digit: Integration Separation 0: Inactive 1: Active Tens Digit: Whether stop the integration after the output has reached the limit value 0: Continued Integration 1: Stop Integration	00	
F9-26	Detection Value of PID Feedback Loss	0.0%: Not judged as feedback loss 0.1%-100.0%	0.0%	
F9-27	Detection Time of PID Feedback Loss	0.0s-20.0s	0.0s	
F9-28	PID Calculation after the Stop	0: No Calculation After the Stop 1: Calculation after the Stop	0	

Function Code	Function Description	Setting Range	Factory Default Value	Change
FA-14	The First Fault Type	0: No Fault 1: Reserved 2: Speed-up Over Current 3: Speed-down Over Current 4: Constant Speed Over Current 5: Speed-up Over Voltage 6: Speed-down Over Voltage 7: Constant Speed Over Voltage 8: Overload of buffer resistance 9: Low Voltage 10: Over Load of inverter 11: Over Load of Motor 12: Input Phase Failure 13: Output Phase Failure 14: Module Over Heat 15: Externa. Fault 16: Communication Fault 17: Contactor Fault 18: Current Detection Fault 19: Motor tuning fault 20: Reserved 21: Parameter writing and reading fault 22: Hardware fault of inverter 23: Motor is short-cuirted to the earth 24: Reserved 25: Reserved 26: Running Time Arrival 27: Reserved 28: Reserved 29: Power-on Time Arrival 30: Off-load 31: PID feedback loss duing the running 40: Rapid current limitation delay 41: Motor switching during the running 42: Reserved 43: Reserved 45: Reserved 51: Reserved	-	●
FA-15	The Second Fault Type		-	●
FA-16	The Third (the Last) Fault Type		-	●
FA-21	Output Terminal Status during the Third (the latest time) Fault	-	-	●
FA-22	Frequency Converter Status during the Third (the latest time) Fault	-	-	●
FA-23	Power On Time during the Third (the latest time) Fault	-	-	●
FA-24	Running Time during the Third (the latest time) Fault	-	-	●

Function Code	Function Description	Setting Range	Factory Default Value	Change
FA-25	Reserved			
FA-26	Reserved			
FA-27	Second Fault Frequency	-	-	●
FA-28	Second Fault Current	-	-	●
FA-29	Second Fault Bus Voltage	-	-	●
FA-30	Input Terminal Status during Second Fault	-	-	●

Function Code	Function Description	Setting Range	Factory Default Value	Change
FA-60	Reserved			
FA-61	Voiltage Raise Judgment time after instant power off	0.00s-100.00s	0.50s	
FA-62	Judgment Voltage of instant power off action	60.0%-100.0% (Standard Bus Voltage)	80.0%	
FA-63	Off-load Protection Selection	0: Inactive 1: Active	0	
FA-64	Off-load Protection Level	0.0-100.0%	10.0%	
FA-65	Off-load Protection Time	0.0-60.0s	1.0s	
FA-66	Reserved			
FA-67	Over-speed Detection Value	0.0% -50.0%(Mximum Frequency)	20.0%	
FA-68	Over-speed Detection Time	0.0s-60.0s	5.0s	
FA-69	The Speed deviation is higher than the detection value	0.0% -50.0%(Mximum Frequency)	20.0%	
FA-70	High speed deviation during the detection time	0.0s-60.0s	0.0s	
FB Group: Swing Frequency and Counting Meter Parameter Group				
FB-00	Swing Frequency Setting Method	0: Relative to Central Frequency 1: Relative to Maximum Frequency	0	
FB-01	Swing Frequency Amplitude	0.0%-100.0%	0.0%	
FB-02	Startup Frequency Amplitude	0.0%-50.0%	0.0%	
FB-03	Swing Frequency Cycle Time	0.1s-3000.0s	10.0s	
FB-04	Rising Time of the Triangle Wave of the Swing Wave	0.1%-100.0%	50.0%	
FB-05	Setting Length	0m-65535m	1000m	
FB-06	Actual Length	0m-65535m	0m	
FB-07	Pulse Number per Meter	0.0-6553.5	100	
FB-08	Setting Counter Value	1-65535	1000	
FB-09	Designated Counter Value	1-65535	1000	

Function Code	Function Description	Setting Range	Factory Default Value	Change
		FC Group: 485 Communication Parameter Group		
FC-00	Baud Rate	Signal Digit: MODBUS 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS Tens Digit: Profibus-DP 0: 115200BPs 1: 208300BPs 2: 256000BPs 3: 512000Bps Hundreds Digit: Reserved Thousand Digit: CANlink Baud Rate 0: 20 1: 50 2: 100 3: 125 4: 250 5: 500 6: 1M	6005	
FC-01	Data Format	0: No Check(8-N-2) 1: Odd Check(8-E-1) 2: Odd Parity Check (8-O-1) 3: No Check(8-N-1)	0	
FC-02	Address of the Machine	1-249, 0 is broadcasting address	1	
FC-03	Resoonse Delay	0ms-20，Re 4		

Function Code	Function Description	Setting Range	Factory Default Value	Change
FD Group: Multi-segement Speed and Simple PLC Parameter Group				
FD-00	MS Command 0	-100.0%-100.0%	0.0%	
FD-01	MS Command 1	-100.0%-100.0%	0.0%	
FD-02	MS Command 2	-100.0%-100.0%	0.0%	
FD-03	MS Command 3	-100.0%-100.0%	0.0%	
FD-04	MS Command 4	-100.0%-100.0%	0.0%	
FD-05	MS Command 5	-100.0%-100.0%	0.0%	
FD-06	MS Command 6	-100.0%-100.0%	0.0%	
FD-07	MS Command 7	-100.0%-100.0%	0.0%	
FD-08	MS Command 8	-100.0%-100.0%	0.0%	
FD-09	MS Command 9	-100.0%-100.0%	0.0%	
FD-10	MS Command 10	-100.0%-100.0%	0.0%	
FD-11	MS Command 11	-100.0%-100.0%	0.0%	
FD-12	MS Command 12	-100.0%-100.0%	0.0%	
FD-13	MS Command 13	-100.0%-100.0%	0.0%	
FD-14	MS Command 14	-100.0%-100.0%	0.0%	
FD-15	MS Command 15	-100.0%-100.0%	0.0%	
FD-16	Running Method of Simple PLC	0: Shut-down after Single Operation 1: Maintain the the Final Value after Single Operation 2: Constant Circulation	0	
FD-17	Power Off Memory Selection of Simple PLC	Sigle Digit: Power Off Memory Selection 0: No Memory for Power Off 1: Power Off Memory Tens Digit: Shut-down Memory Selection 0: No Memory for Shut-down 1: Shut-down Memory	00	
FD-18	0 Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-19	Speed-up and Speed-down Time Selection of Simple PLC	0-3	0	
FD-20	The First Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	

Function Code	Function Description	Setting Range	Factory Default Value	Change
FD-21	The first Segment Speed-up and Speed-down Time Selection of Simple PLC	0-3	0	
FD-22	Second Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-23	Second Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	
FD-24	Third Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-25	Third Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	
FD-26	Fourth Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-27	Fourth Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	
FD-28	Fifth Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-29	Fifth Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	
FD-30	Sixth Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-31	Sixth Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	
FD-32	Seventh Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-33	Seventh Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	
FD-34	Eighth Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-35	Eighth Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	
FD-36	Nineth Segment Running Time of Simple PLC	0.0s(h)-6500.0s(h)	0.0s(h)	
FD-37	Nineth Segment Speed-up/Speed-down Time Selection of Smiple PLC	0-3	0	

Function Code	Function Description	Setting Range	Factory Default Value	Change
FE Group: Torque Control and Optimization Parameter Group				
FE-00	Speed/Torque Control Method Selection	0: Speed Control 1: Torque Control	0	
FE-01	Setting Source Selection of Torque under Torque Control Mode	0: Reserved 1: VI 2: CI 3: Reserved 4: Reserved 5: Communication Setting 6: MIN(VI,CI) 7: MAX(VI,CI)	0	
FE-02	Reserved			
FE-03	Digital Setting of Torque under Torque Control Mode	-200.0%-200.0%	150.0%	
FE-04	0Hz PWM Output Control Mode	0: Inactive 1: Active	0	
FE-05	Maximum Frequency in Forward Direction of Torque Control	0.00Hz-Mximum Frequency	50.00Hz	
FE-06	Maximum Frequency in Reverse Direction of Torque Control	0.00Hz-Mximum Frequency	50.00Hz	
FE-07	Speed-up Time of Torque Control	0.00s-65000s	0.00s	
FE-08	Speed-down Time of Torque Control	0.00s-65000s	0.00s	
FE-09	Switching of DPWM Upper Frequency	0.00Hz-15.00Hz	12.00Hz	
FE-10	PWM Modulation Method	0: Asynchronous Modulation 1: Synchronous Modulation	0	
FE-11	Dead-time Compensation Mode Selection	0: No Compensation 1: Compensation Mode 1 2: Compensation Mode 2	1	
FE-12	Random PWM Depth	0: Ranbdom PWM Inactive 1-10: PWM Carrier Frequency Random Depth	0	
FE-13	Enable Signal of Fast Current Limitation	0: Inactive 1: Active	1	
FE-14	Current Detection Compensation	0-100	5	
FE-15	SVC Optimization Mode Selection	0: No Optimization 1: Optimzed Mode 1 2: Optimized Mode 2	1	
FE-16	Setting of Under-voltage Point	60.0%-140.0%	100.0%	
FF Group: Factory Parameter Group				

Function Code	Name	Minimum Unit
U0 Group: Basic Monitoring Parameters		
U0-00	Operation Frequency (Hz)	0.01Hz
U0-01	Setting Frequency (Hz)	0.01Hz
U0-02	Busbar Volrage (V)	0.1V
U0-03	Output Voltage (V)	1V
U0-04	Output Current (A)	0.01A
U0-05	Output Power (kW)	0.1kW
U0-06	Output Torque (%)	0.10%
U0-07	Min Input Status	1
U0-08	MO Output Status	1
U0-09	VI Voltage (V)	0.01V
U0-10	CI Voltage (V)	0.01V
U0-11	Reserved	
U0-12	Count Value	1
U0-13	Length Value	1
U0-14	Load Speed Display	1
U0-15	PID Setting	1
U0-16	PID Feedback	1
U0-17	PLC Stage	1
U0-18	Reserved	
U0-19	Feedback Speed (Unit: 0. 1Hz)	0.1 Hz
U0-20	Residual Running Time	0.1 Min
U0-21	VI Voltage before Correction	0.001V
U0-22	CI Voltage before Correction	0.001V
U0-23	Reserved	
U0-24	Linear velocity	1m /Min
U0-25	Current Power On Time	1Min
U0-26	Current Running Time	0.1 Min
U0-27	Reserved	
U0-28	Communication setting value	0.01%
U0-29	Reserved	
U0-30	Main frequency X Display	0.01Hz
U0-31	Auxiliary frequency X Display	0.01Hz

6. EMC (Electromagnetic Compatibility)

6.1 Definition

Electromagnetic compatibility is the ability of the electric equipment to run in the electromagnetic interference environment and implement its function stably without interferences on the electromagnetic environment.

6.2 EMC Standard Description

In accordance with the requirements of the national standard GB/T 12668.3, the inverter needs to comply with electromagnetic interference and anti-electromagnetic interference requirements.

The existing products of our company apply the latest international standard –IEC/EN61800-3: 2004 (Adjustable speed electrical power drive system Part 3: EMC requirements and specific test methods), which is equivalent to the national standard GB/T 12668.3.

IEC/EN61800-3 assesses the inverter in terms of electromagnetic interference and anti-electronic interference. Electromagnetic interference mainly tests the radiation interference, conduction inference and harmonics interference on the inverter (required for the inverter for civil use. Anti-electromagnetic interferences mainly tests the conduction interference rejection, radiation interference rejection, surge interference rejection, fast and mutable pulse group interference rejection, ESD interference rejection and power low frequency end interference rejection (specific test items including: 1. Interference rejection tests of input voltage sag, interrupt and change; 2. Phase conversion interference rejection test; 3. Harmonic input interference rejection test; 4. Input frequency change test; 5. Input voltage unbalance test; 6. Input voltage fluctuation test).

6.3 EMC Guide

6.3.1 Harmonic Effect

Higher harmonics of power supply may damage the inverter. Thus, at some places where mains quality is rather poor, it is recommended to install AC input reactor.

6.3.2 Electromagnetic Interference and Installation Precautions

There is distributed capacitance between the output cables of the inverter. If the current passing the lines has higher harmonic, it may cause resonance and thus result in leakage current. If thermal relay is used, it may generate error action.

The solution is to reduce the carrier frequency or install output reactor. It is recommended that thermal relay not be installled before the motor when using the inverter, and that electronic over current protection function of the inverter be used instead.

6.3.6 Precauations for Installing EMC Input Filter at the Input End of Power Supply

1. When using the inverter, please follow its rated valukes strictly. Since the filter belongs to classification I electric applilcanes, the metal enclosure of filter shall be large and the metal ground of the installing cabinet shall be well earthed and have good conduction continuity. Otherwise there may be danger of electric shock and the EMC effect may be greatly affected.

2. Through the EMC test, it is found that the filter ground must be connected with the PE end of the inverter at the same public earth. Otherwise the EMC effect may be greatly affected.

3. The filter shall be installed at the place close to the input end of the power supply as much as possible.

7. Communicat

The host station writes the command frame:

>3.5 Byte	1 Byte	1 Byte	2 Byte	2 Byte	2 Byte	
Idle (Frame Header)	Address of Target Station	Reading Command 0x06	Address of Function Code H------L	Parameter of Function Code H------L	Total CRC Checking H------L	Idle

Calculate the CRC Checking

The host station writes the response frame:

>3.5 Byte	1 Byte	1 Byte	2 Byte	2 Byte	2 Byte	
Idle	Address of Target Station	Write Command 0x06	Address of Function Code H------L	Parameter of Function Code H------L	Total CRC Checking H------L	Idle

Calculate the CRC Checking

In case a passive machine detects the error of the communication frame or fails in reading or writing the frame due to any other reasons, it would response to the frame in error.

Passive station reads the response frame with error

>3.5 Byte	1 Byte	1 Byte	1 Byte	2 Byte	
Idle (Frame Header)	Address of Target Station	0x83	Error Type	Total CRC Checking H------L	Idle

Calculate the CRC Checking

Passive station writes the response frame with error

>3.5 Byte	1 Byte	1 Byte	1 Byte	2 Byte	
Idle (Frame Header)	Address of Target Station	0x86	Error Type	Total CRC Checking H------L	Idle

Calculate the CRC Checking

Error Type:

01: Command Code Error

02: Address Error

03: Data Error

04: The Command Could Not Be Processed

Description for the Field of Data Frame:

Frame Header START	The idle time longer than the transmission time of 3.5 characters
Address of Passive Machine ADR	Communications Address: 0-249; 0= broadcasting address
Command Code CMD	03: Read the parameter of passive machine; 06= write the parameter of passive machine
Function Code Address H	The parameter address within the inverter, which shall be indicated with hexadecimal value system; it could be divided into function code type and non-function code type (like the running status parameter, running command and etc). Refer to the definition of the address. During the transmission, the high byte would be at the front and the low byte would be located at the later place.
Function Code Address L	
Number of Function Codes H	The number of function codes read by the current frame. The number 1 indicates the frame only reads one function code. During the transmission, the high byte would be in the front and the low byte would be at the later place. The protocol could only modify one function code and there is no such field.
Number of Function Code L	
Data H	The data replied, or the data to be written. During the transmission, the high byte would be transmitted before the low byte.
Data K	
CRC CHK Low Order	Detection value: the checking value of CRC16. During the transmission, the high byte would be transmitted before the low byte. Please refer to the description in CRC checking in this section for the detailed information about the calculation method.
CRCC CHK High order	
END	3.5 characters

CRC Checking Method:

CRC (Cyclical Redundancy Check) uses the RTU mode. In RTU mode, messages include an error-checking field that is based on a CRC method. The CRC field checks the contents of the entire message. The CRC field is two bytes, containing a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal with each other, an error would result.

The CRC is started by 0xFFFF. Then a process begins of applying successive eight-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating CRC. Start and stop bits, and the parity bit, do not apply to CRC.

During generation of the CRC, each eight-bit character is different or (XOR) with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was 1, the register is then exclusive ORed with a preset value, fixed value. If the LSB was a 0, no exclusive OR takes places. This process is repeated until eight-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte. The simple function of CRC is shown as below:

```
unsigned int crc_chk_value (unsigned char *data_value, unsigned char length){
unsigned int crc_value=0xFFFF;
inti;
while (length--){
crc_value^=*data_value++;
for (i=0;i<8;i++){
if (crc_value&0X0001)
{
Crc_value=(crc_value>>1)
^0Xa001;
}
Else
{
Crc_value=crc_value>>1
}
}
}
return (crc_value);
}
```

Definition for the Address of Communications Parameters:

Read and write function-code parameters (some functional code is not changes, only for the usage or monitoring of the manufacturer).

7.1.5 The Mark Rules of Function Code Parameters Address

Indicating rules for the parameters address indicated by group number and mark of function code:

High order bytes: F0 –FF (F Group), 70 -7F (U Group)

Low order bytes: 00 –FF

Some parameters could not be changed when the inverter is under the running status. Some parameter could be adjusted no matter what status the inverter is under.

During the change of the parameters for function code, it is necessary to pay attention to the range, unit and related description of the parameters.

Group Number of the Function Code	Communication Access Address	Address of the function code in the Communication Modified RAM
F0 –FE Group	0XF0000 -0XFEFF	0X0000 -0X0EFF
U0 group	0X7000 -0X70FF	

Caution! Since EFPROM could be frequently stored, it will reduce the lifetime of EEPROM. In the communication mode, and some function code needn't be stored as long as change the RAM value.

To achieve this

Control command input to inverter (write-only):

Command Word Address	Command Function
2000H	0001: Forward operation
	0002: Reverse operation
	0003: Forward jog
	0004: Reverse jog
	0005: Free stop
	0006: Speed-down stop
	0007: Fault reset

Read inverter status (read-only):

Status Word Address	Status Word Function
3000H	0001: Forward operation
	0002: Reverse operation
	0003: Stop

Parameters locking password checking: (If the return is the 8888H, it indicates the password pass the checking)

Password Address	Contents of Input password
1F00H	*****

Digital output terminal control: (write-only)

Command Address	Command Content
2001H	BIT0: MO1 output control BIT1: MO2 output control BIT2: RELAY1 output control BIT3: RELAY2 output control BIT4: FMR FMR output contro BIT5: Reserved BIT6: Reserved BIT7: Reserved BIT8: Reserved BIT9: Reserved

Analog output AM control: (write-only)

Command Address	Command Content
2002H	0-7FFF refers to 0% to 100.00%

Analog output FM control: (write-only)

Command Address	Command Content
2003H	0-7FFF refers to 0% to 100.00%

Pluse output control: (write-only)

Command Address	Command Content
2004H	0-7FFF refers to 0% to 100.00%

Inverter fault description:

Inverter Fault Address	Inverter fault information	
8000H	0000: No fault 0001: Reserved 0002: Speed-up over current 0003: Speed-down over current 0004: Constant over voltage 0005: Speed-up over voltage 0006: Speed-down over voltage 0007: Constant over voltage 0008: Buffer resistance overload fault 0009: Low voltage fault 000A: Inverter overload 000B: Motor overload 000C: Reserved 000D: Output phase failure 000E: Module overheat 000F: External fault 0010: Communication Fault 0011: Contactor fault 0012: Current detection fault 0013: Motor tuning fault 0014: Reserved	0015: Parameter reading and writing failure 0016: Hardware failure of inverter 0017: Grounding short-circuit fault of motor 0018: Reserved 0019: Reserved 001A: Running time arrival 001B: Customized Definition fault 1 001C: Customized Definition fault 2 001D: Power on time arrival 001E: Off-load 001F: PID feedback lost during running 0028: Time out fault of the fast current limiter 0029: Motor switching fault during running 002A: High speed deviation 002B: Over speed of motor 002D: Overheating of motor 005A: Setting fault of the number of lines of coder 005B: Not connected with coder 005C: Fault of initial position 005E: Speed feedback fault

7.2 Definition of the Communication Data Address

This series inverter supports four kinds of communication protocols including Modbus, CANopen, CaNlink and Profibus-DP. The programmable card and the point-to-point communication belong to the derivatives of CANlink protocol. Through these communication protocols, the upper-computer could achieve the control, monitoring and parameter modification or checking for the inverter.

The communication data could be divided into function code data and non-function code data. The non-function data consists of running command, running status, running parameters, warning information and etc.

7.2.1 Function Code Data

Function code data is the major setting parameters of the inverter. The function code data is shown as below:

Function Code Data	F Group (could read and write)	F0, F1, F2, F3, F4, F5, F6, F7, F8, F9, FA, FB, FC, FD, FE, FF

1. When communication reads the function code data:

For the function code data in F0-FF group, the high order 16-bit of communication address is the function group number directly, and the low order 16-bit communication address is the serial number of the function code in function group. Here are the examples:

F0-16 is function parameter and its communication address is F010H, where F0H indicates the function parameter in F0 group, and 10H indicates the hexadecimal system data format of serial number 16 in the function group.

2. When communication writes the function code data:

For the function code data in F0-FF Group, the communication address is high order 16-bit. Based on whether the data needs to be written into the EEPROM, the data could be divided into 00-0F or F0-FF. The low 16-bit is the serial number of the function code in the function group directly. Here is the example:

Write function parameter F0-16

No need to write into the EEPROM, the communication address is 0010H

Need to write into the EEPROM, the communication address is F010H

7.2.2 Non-function Code Data

Non-function Code Data	Status Data (Read Only)	U group monitoring parameter, fault description of inverter, running status of inverter
	Control Parameter (Write Only)	Control command, communication setting value, digital output terminal control, analog output AM control, analog output FM control, output control, parameter initialization

1. Status Data

The status data mainly consist of U group monitoring data, fault description of inverter and running status of inverter.

U Group Parameter Monitoring Parameter

The description of the U Group monitoring data is stated in the relative sections in chapter 5 and chapter 6. The definitions of the address are shown as below:

U0-U31, the high order 16-bit of the communication address is 70-7F, and the low 16-bit is the serial number of the monitoring parameter in the group. For example, the communication address for U0-11 is 700BH.

Description for the Inverter Fault

When the communication is reading the description of inverter fault, the communication address is fixed at 8000H. The upper-computer could acquire the current fault code of the inverter through the reading of this address data. The description of the fault code is stated in the running status of inverter in the definition of the function code of F9-14 in chapter 5.

When the communication is reading running status of inverter, the communication address is fixed at 3000H. The upper-computer could acquire the current running status of the inverter through the reading of this address data. The definition is shown as below:

Running Status Communication Address	Definition of the Reading Status Word
3000H	1. Forward operation
	2. Reverse operation
	3. Stop

2. Control Parameter

The control parameters consist of control command, digital output terminal control, analog output AM control and analog output FM control.

Control Command

When F0-02 (command source) is selected at 2: under the communication control, the upper-computer would realize the control of related commands like the stop or start of inverter through this communication address. The definitions of these commands are shown as below:

Control Command Communication Address	Command Function
2000H	1. Forward operation
	2. Reverse operation
	3. Forward jog
	4. Reverse jog
	5. Free stop
	6. Speed-down stop
	7. Fault reset

Communication Setting Value

The communication setting values are mainly used as the reference data when the frequency source, torque upper source, VF separation voltage source, PID reference source, PID feedback source and etc has been selected as the communication reference. The communication address is 1000H. When using the upper-computer to set the value of communication address, the data range of the communication address value is between -10000 and 10000, which correspond with the reference value from -100% to 100%.

Digital Output Terminal Control

When the function of the digital output terminal is selected at 20: under the communication control, the upper-computer could realize the control for the digital output terminal of the inverter through this communication address. Here is the definition of the command for reference:

Communication Address of the Digital Output Terminal Control	Command Name
2001H	BIT0: MO1 output control BIT1: MO2 output control BIT2: RELAY 1 Output control BIT3: RELAY 2 Output Control BIT4: Reserved BIT5: Reserved BIT6: Reserved BIT7: Reserved BIT8: Reserved BIT9: Reserved

Analog Quantity Output AM and FM

When the analog quantity output is AM and FM: under the communication setting, the upper-computer could realize the control of the analog quantity of the inverter through this communication address. Here is the definition of the parameters:

Output Control Communication Address		Command Content
AM	2002H	0-7FFF indicates 0% to 100%
FM	2003H	

8. Fault Diagnosis and Solution

Fault Code	Fault Type	Checking for Potential Causes	Counter-measures
Err06	Deceleration over voltage	1. If the input voltage is too high 2. If there are external forces driving the motor to run during the deceleration process 3. If the deceleration time is too short 4. If the brake unit and brake resistor are installed	1.

Fault Code	Fault Type	Checking for Potential Causes	Counter-measures
Err15	External equipment fault	1. If it inputs external fault signal via the multifunctional terminal DI 2. If it inputs external fault signal via the multifunctional virtual IO	1. Reset to run 2. Reset to run
Err16	Communications fault	1. If the host computer is working 2. If the communication cable is work properly 3. The setting of the communication expansion card F0-28 is incorrect The communication parameter FD is not correctly set.	1. Check the host computer cable connection 2. Check the cable for communications 3. Correctly set the type of communication expansion card 4. Modify the communication parameters
Err17	Contactor Fault	1. Check if the drive board and power supply is normal 2. Check if the contactor is normal	1. Replace the control board or power supply 2. Replace the contactor
Err18	Current detection fault	1. Check if the hall device is normal 2. Detect if the drive board is normal	1. Replace the hall device 2. Replace the drive board
Err19	Motor tuning fault	1. If the motor parameters are set as per the motor nameplate 2. If the parameter identification process is delayed	1. Set the motor parameters correctly according to the nameplate 2. Check the cable connecting the inverter to the motor
Err20	Reserved		
Err21	EEPROM Reading and Writing Fault	Damage of the chip of EEPROM	1. Replace the main control board
Err22	Inverter hardware fault	1. If it is over voltage 2. If it is over current	1. Handle according to the countermeasures for over voltage fault 2. Handle according to the countermeasures for over current fault
Err23	Fault of Short Circuit to Earth	1. Detect if the motor is short circuited to earth	1. Replace the cable or motor
Err24	Reserved		
Err25	Reserved		
Err26	Accumulative Running Time Arrival Fault	1. If the accumulative running time has reached the setting value	1. Clear off the memory information through the parameter initialization
Err27	Reserved		
Err28	Reserved		
Err29	Accumulative Power On Time Arrival Fault	1. If the accumulative power on time has reached the setting value	1. Clear off the memory information through the parameter initialization

Fault Code	Fault Type	Checking for Potential Causes	Counter-measures
Err30	Off Load Fault	1. The running current of the inverter is lower than F9-64	1. Check if it is off load or the setting of F9-64 and F9-65 are matching with the actual working conditions
Err31	PID Feedback Loss Fault during the Running	1. The Feedback of PID is lower than the setting value of FA-26	1. Check the PID Feedback Signal or Set the FA-26 at an Appropriate Value
Err40	Wave and Current Limitation Protection Fault	1. If the load is too heavy or motor does not rotate 2. The inverter selected is too small	1. Reduce the load and check the machinery 2. Select the inverter with higher power grade
Err41	Motor Switching Fault During Running	1. Change the current motor selection during the running through the terminals	1. Perform the motor switching after the inverter has stopped
Err42	Reserved		
Err43	Reserved		
Err45	Reserved		
Err51	Reserved		

8.2 General Faults and Counter-measures

Fault Phenomenon	Possible Cause	Solution
No display upon power on	The power grid does not have any voltage or the voltage is too low' The fault of the switching power supply on the drive board of the inverter; Damage of the rectifier; Damage of the buffer resistor of the inverter; Fault of the control board and keyboard; Disconnection between the control board and the drive board or keyboard.	Check the input power supply. Check the voltage of bus line. Plug/unplug the 8-core and 28-core bus once again. Consult the manufacturer.
HC is displayed upon power-on	Poor contact of the connecting cable between the drive board and the control board; Damage of the relative device on the control board; Motor or the motor cable is short-circuit to the ground; Hall fault; The voltage in the power grid is too low.	Consult the manufacturer.

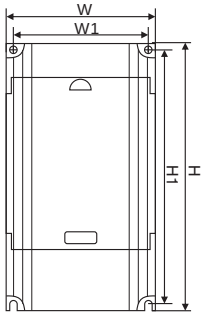
Fault Phenomenon	Possible Cause	Solution
“ ERR23” alarm is displayed upon Power-on.	The motor or the output line is short circuited to the earth The inverter is damaged.	Measure the insulation of the motor and output line with magneto-ohmmeter; Consult the manufacturer.
The inverter displays normally upon power-on, but “HC” is displayed upon running and stops immediately	The fan is damaged or blocked; Short-circuit exist in the wiring of the periphery control terminals	Replace the fan; Correct the external short-circuit fault.
ERR14 (Module Overheat) Fault is frequently reported	The setting of load frequency is too high; Damage of fan or block of air duct; Damage of the internal devices of inverter (thermal coupler or others)	Reduce the load frequency (F0-15); Replace the fan or clear off the air duct; Consult the manufacturer.
The motor does not rotate upon Inverter Running	Motor and motor cable; Wrong setting of the parameter of inverter (motor parameters); Poor contact between the drive board and control board; Fault of drive board.	Check the connecting cable between the inverter and motor; Replace the motor or solve the motor fault; Check and reset the parameters of motor.
MIn terminal disabled	Wrong setting of parameters; Fault of external signals; Loosen of the connecting cable between OP and +24V Fault of control board	Check and reset the related parameter in F4 group; Reconnect the external single cable; Re-confirm the connecting cable between Op and +24V; Consult the manufacturer.
The inverter frequently reports over current fault and over voltage fault	The motor parameters are set wrongly. Acceleration/deceleration time is improper. Load fluctuates.	Reset the parameters of motor, or perform the tuning of the motor; Set appropriate acceleration or deceleration time; Consult the manufacturer.
Err17 alarming upon Power-on	The soft-starting contactor is not connected	Check if any loosen of the cable for contactor; Check if any fault of the contactor; Check if any fault in the 24V power supply of the contactor; Consult the manufacturer.
Display 88888 upon Power-on	Damage of the relative device on the control board	Change the control board

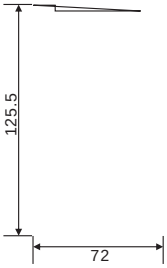
Appendix: Installation dimension

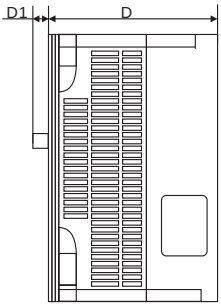
Simple type (0.4 - 2.2KW) 320S Series

Power	W	W1	H	H1	D	D1
0.4KW 220V 0						

Simple type (4 - 7.5KW) 320S Series





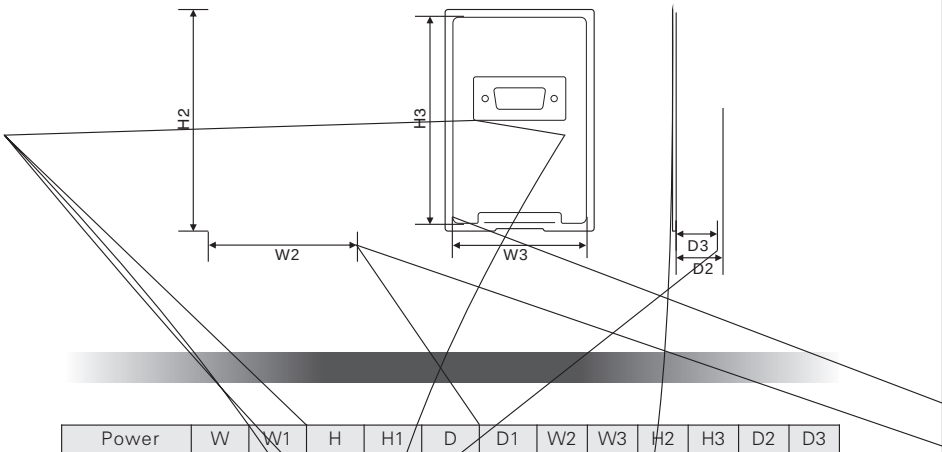


4-7.5KW series chassis type table

Unit mm

Power	W	W1	H	H1	D	D1
4.0KW 380V 5.5KW 380V 7.5KW 380V	130.0	115.0	264.0	244.0	153.5	9.0

(0.4 - 7.5KW) Series



Power	W	W1	H	H1	D	D1	W2	W3	H2	H3	D2	D3
0.75KW 220V 1.5KW 220V 2.2KW 220V 0.75KW 380V 1.5KW 380V 2.2KW 380V	113	100.5	174	162.8	140	132	51	46.8	75.8	71.5	19	16.5
4.0KW 380V 5.5KW 380V 7.5KW 380V	160.7	146.7	246	232	155.5	147.5	67	61.5	99.7	94	19	16.5

(11 - 450KW) Series

11-450KW series chassis type table

Unit mm

Power	H	W	D	H1	W1	Aperture
11KW 15KW 18.5KW(塑壳)	375	210	196	362.5	160	7
22KW 30KW 37KW	440	285	206	424	238	8
45KW 55KW	600	385	267.7	580	260	10
75KW 93KW	659	413	327	635	293	12