FC300 SERIS
USER MANUAL
High-Performance Frequency Inverter

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CHAPTER 1   SUMMARIZE

1.1 Foreword

FC300 series inverters are high performance models designed for a wide range of special applications. The parameter debugging is simple and easy. You can turn the model to your desired specialized model by barely pressing one key. Additionally, the parameter copy function makes the operation easier.

To gain a better performance of the inverter, it's strongly recommended you read this manual carefully before using the inverters and keep it well for future use.

If during usage you encounter any problems which you cannot solve, please contact us at any time. Considering your safety, please make sure the inverters are debugged and revised by specialized electrical engineers with qualifications. There are ⚠ symbols to remind you of the safety matters during moving, installing, operating and inspecting inverter.

1.2 Receiving Inspection and Safety Precautions

FC300 series inverters have gone through strict testing and quality inspection before sales. When you receive the cargo, please check:

● Whether the package is well or damaged by careless shipping;
● Whether the product model and parameter are same with your order details.

1.2.1 Inspection after Unpacking

● Each inverter is packed with one manual, one warrantee card, and one certification card inside;
● Check the nameplate on the profile of inverter, to confirm the model received is the right one.

Inverter Nameplate:
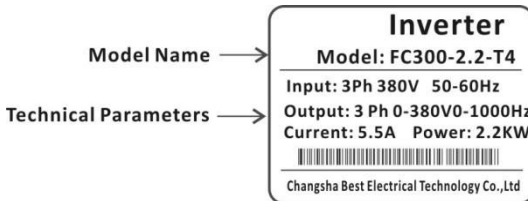
Model Explanation:

1.2.2   Safety Precautions

> ∕ **DANGER**   ∕ indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

> ⚠   **CAUTION**   ⚠ indicates a potentially hazardous situation which, if not avoided, can result in damages to inverter or mechanical systems.
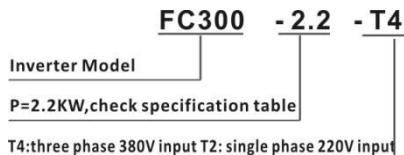
Notice: Based on different situations, "CAUTION" issue may also cause severe consequences. Please comply with above two grade issues, which are both vital to our individual safety.

<div>

∕ DANGER

● Make sure the power is off before wiring.

● Within 10 minutes after turning off AC power supply, there's high voltage still inside inverter, which is extremely dangerous. DO NOT touch the electric circuit or any spare part inside.

●When inverter is under working, DO NOT inspect the spare part or signal on electric circuit.

● DO NOT dismount or change the inside wiring, electric circuit or spare part by yourself.

● DO NOT operate inverter with a wet had in case of electric shock.

● Inverter ground terminals must be correctly grounded.

● It is prohibited to reassemble or change control board and spare parts, otherwise there will be dangers such as electric shock, explosion, etc.

● NEVER open inverter cover or touch the spare parts on circuit board when inverter is power-on. There is high voltage on these parts. Beware of electric shock which results death!!!

⚠CAUTION

● DO NOT carry out puncture test on the accessories inside the inverter, for they are prone to be damaged by high voltage.

● NEVER connect the output terminal U.V.W to AC power supply.

● When power is on or has been cut off just for a short while, inverter and braking resistor stay in high temperature, DO NOT touch them in case of being scalded.

● The voltage on each terminal must comply with the indication on manual, to prevent crack and damage.

● Inverter main electric board CMOS, IC are prone to be influenced and damaged by static electricity.

● Only qualified specialized persons are permitted to install, debug and maintain the inverters.

● Dump the inverters as industrial waste. Burning is not allowed.

● After the inverter being kept aside for long time, inspection and commissioning are required before using.

● Inverters can be set for high speed running easily. Please check whether the motor and mechanic properties are competent before revising the settings.

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1.2.3   Moving and Placing

⚠CAUTION

● While moving the inverter, please DO NOT directly hold up the front cover, instead, shall hold the inverter from the pedestal, in case that the front cover slips off or inverter falls down, even causing damages to human or inverter.

● Install the inverter on nonflammable material like metal, to avoid fire disaster.

● Choose a proper and safe place to install the inverter, where there is non high temperature or direct sunlight, to avoid moisture and water drops.

● Prevent children or unconcerned people from approaching the inverter.

● This inverter can only be used in the areas which are approved by our company, unapproved performance environment may result in fire disaster, gas explosion, electrification, etc.

● If several inverters are installed in one common control cabinet, please install extra cooling fans to keep the inside temperature below 40℃, in order to avoid overheat, fire disaster, etc.

● Please at first make sure the power is off then dismount or install the operation keypad, and fasten the front cover, in case of poor contact which may cause operation fault or non display.

● DO NOT place the inverter in the environment where there is explosive gas, otherwise it will result in danger of explosion.

● In the areas 1000m above sea level, since the heat dissipation of the inverter becomes worse, please select one grade higher model.

● On output side please DO NOT install contactor or other capacitor, varistor related accessories, otherwise it will cause inverter faults or device damages.

● On output side please DO NOT install switching devices such as air switch and contactor. If these have to be installed at the place due to some technology reason or else, then please make sure the inverter has NO output action during switch turning on or off. In addition, it is prohibited to install capacitor with power improving function or lightning-proof varistor, otherwise, it may result in inverter faults, tripping to protection or damage to components.

● Please connect inverter to an independent power supply, definitely NEVER share a power supply with machines like electric welder, otherwise it may cause inverter to trip for protection or even damaged.

⚠CAUTION

Before power on

● The power supply voltage adopted must comply with the rated input voltage of the inverter. PE symbol means ground terminal. Please make sure to ground the motor and inverter correctly to ensure safety.

● When there is contactors installed between power supply and inverter, please Do Not use contactor to control the running and stopping of inverter, otherwise it will reduce inverter's service life.

● Main loop must be wired correctly. R.S.T(L.N) is power supply input terminal, NEVER connect this terminal with U.V.W, otherwise it will cause inverter damage when power is on.

During power on
● When power is on, NEVER insert or pull the contactors on the inverter, in case that the surge caused from the inserting or pulling enters into the control mother board and results in inverter damage.

During Running
● When inverter is running, it is prohibited to add or disconnect the motor group, otherwise it will cause the inverter to over-current trip, or even burn down the main loop of inverter.
● DO NOT take off the front cover when power is on, in case it result in human injury or death.
● When fault restart function is turned on, the motor will restart automatically after stop. Please DO NOT approach the machine to avoid accidents.
● Stop switch function is not valid if it is not set before, which is not the same with emergency stop switch. Please use it carefully.

1.3 Specification Table

Three-phase 440V

Power KW		0.75	1.5	2.2	3.0	3.7	5.5	7.5	11	15	18.5
Adapted Motor Power KW		0.75	1.5	2.2	3.0	3.7	5.5	7.5	11	15	18.5
Input	Rated current A	4.0	6.3	8.2	12	14.5	19	25	33	46	52
	Voltage V	three phase 380V±15%									
	Frequency HZ	50/ 60Hz									
Output	Rated current A	2.7	4.2	5.5	8.0	9.5	13	18	24	32	38
	Voltage V	three phase 0-380V									
	Frequency HZ	0-1000Hz									
	Overload protection	200% 0.1S 150% 60S									

Single phase 230V

Power KW		0.75	1.5	2.2	3.0	3.7	5.5	7.5	11	15	18.5
Adapted Motor Power KW		0.75	1.5	2.2	3.0	3.7	5.5	7.5	11	15	18.5

	Rated current A	7.5	11	16	22	27	36	49	73	96	111
Input	Voltage V	single phase 220V±15%									
	Frequency HZ	50/ 60Hz									
	Rated current A	5.0	7.0	11	15	18	25	33	49	65	75
Output	Voltage V	three phase 0-220V									
	Frequency HZ	0-1000Hz									
	Overload protection	200% 0.1S 150% 60S									

Notes:

1. Maximum adapted motor means the maximum power light load engine for the drive of the certain inverter model, by the standard of four-pole motor.
2. Rated output current means the output current when output voltage is 380V (or 220V).
3. Overload capacity is represented by the percentage of the overcurrent to the rated current. When using it repeatedly, please wait till the temperature of inverter and motor decrease below the temperature under 100% load.
4. Maximum output voltage CANNOT exceed power supply voltage. Below power supply voltage, any output voltage can be set freely(voltage peak value of inverter output terminal is DC voltage).
5. Power supply capacity changes according to the value of impedance (including input reactor and cable) on the side of power supply.

1.4   Braking Unit and Braking Resistor

Inverter		Braking unit		Braking resistor		
Voltage	Power KW	Configura-tion	Quanti-ty	Configuration	Specification	Quantity
Single phase 220V	0.75	preset	1	externally mounted	100W /150Ω	1
	1.5	preset	1	externally mounted	400W/100Ω	1
	2.2	preset	1	externally mounted	600W/100Ω	1
	3.0	preset	1	externally mounted	800W/100Ω	1
	3.7	preset	1	externally mounted	800W/100Ω	1
Three-phase 380V	0.55	preset	1	externally mounted	100W /750Ω	1
	0.75	preset	1	externally mounted	100W /750Ω	1
	1.5	preset	1	externally mounted	260W/400Ω	1

|	2.2	preset	1	externally mounted	260W/250Ω	1
	3.0	preset	1	externally mounted	260W/200Ω	1
	3.7	preset	1	externally mounted	390W/150Ω	1
	5.5	preset	1	externally mounted	520W/150Ω	1
	7.5	preset	1	externally mounted	780W/100Ω	1
	11	built-in	1	externally mounted	1040W/75Ω	1
	15	built-in	1	externally mounted	1560W/75Ω	1
	18.5	built-in	1	externally mounted	4800W/40Ω	1

CHAPTER 2   INSTALLATION AND CONNECTION
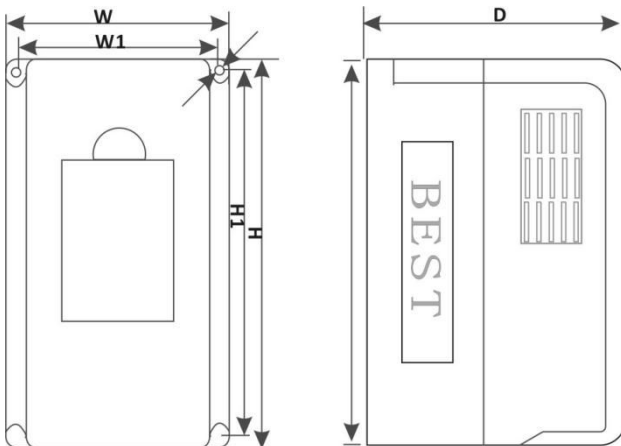
This chapter indicates basic "installation and connection", before using please read all the notices in this chapters carefully.

2.1Case Structure and Dimension

FC300 iron shell model:
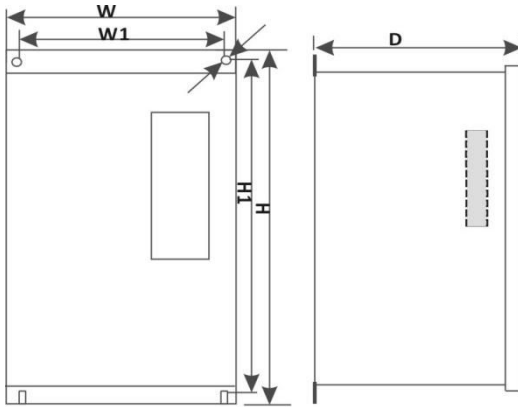
FC300 plastic shell model:

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Outline dimensions of FC300 series inverters:

| Inverter Model	Installation dimension			Outline dimension		
	W(mm)	H(mm)	D(mm)	W1(mm)	H1(mm)	D(mm)
FC300-0.75-S2	108	152	130	94	139	4
FC300-1.5-S2						
FC300-0.75-T4						
FC300-1.5-T4						
FC300-2.2-T4						
FC300-2.2-S2	140	205	156	125	191	5
FC300-3.0-S2						
FC300-3.7-S2						
FC300-5.5-S2						
FC300-3.0-T4						
FC300-3.7-T4						
FC300-5.5-T4						
FC300-7.5-S2	170	280	184	110	266	6
FC300-7.5-T4						
FC300-9-S2	210	338	200	192	319	7
FC300-11-T4						
FC300-15-T4						
FC300-11-S2	248	375	228	160	356	8
FC300-18.5-T4						

2.2 Installation Guidelines

Because inverter is one kind of precise power electronic products, the working environment directly influences the performance and service life of inverter. Therefore, please follow the below:

1. Check whether the inverter installation position environment comply with 1.2.3 instructions, if not, please DO NOT install it, otherwise it will cause damage to inverter.
2. Inverter adopts plastic parts, please do not exert a big force on the cover plate. Install carefully in case of any damage.
3. If conditions allow please openly install the backside plate and cooling fins out of control cabinet, to effectively decrease the temperature in the electrical control cabinet.
4. Install inverter in clean place if possible, or inside of the enclosed type shield board which prevents all the floating material.
5. Inverter shall be installed in vertical direction solidly on the installation board with screws.
6. Pay attention to the heat dissipation method of the inverter which is installed in a control cabinet: under the condition that there are two or more inverters and ventilation fan are

installed together into one electrical control cabinet, please pay attention to select a proper installation position, for ensuring the temperature surround the inverter is within the permissible value. If the installation position is not correct, it will cause the surrounding temperature to rise and the ventilation effect worse.

7. Please install inverter on a nonflammable surface. Inverter temperature may reach a rather high value (about 80 °C). Meanwhile, in order to facilitate heat dissipation, please reserve enough space around.
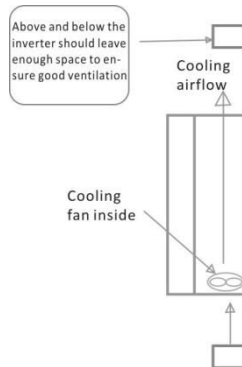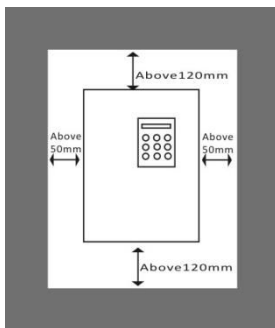
2.3   Connection Guidelines

1. Separate power supply line and control line while installing the wires, e.g. adopt independent trunking. If control electrical circuit linking must across the cable, they should be wired in 90°angle.
2. When using shield wire or twisted pair to connect control electric circuit, make sure the unshielded part as short as possible, if conditions allow, please adopt cable sleeve.
3. Avoid the inverter gravity line(input and output line) and signal line to be parallel-wired or clustered-wired but should be crossed-wired separately.
4. Please use twisted pair shield wire for connection line of detector and signal line for control. The sheath of shield wire connects to COM terminal.
5. The ground wires of inverter and motor shall be connected on a common point.
6. Install data line filter onto signal line.
7. The shield layer of connector line of detector and control signal line must be grounded by cable metal clamp.

2.4 Connection Instruction
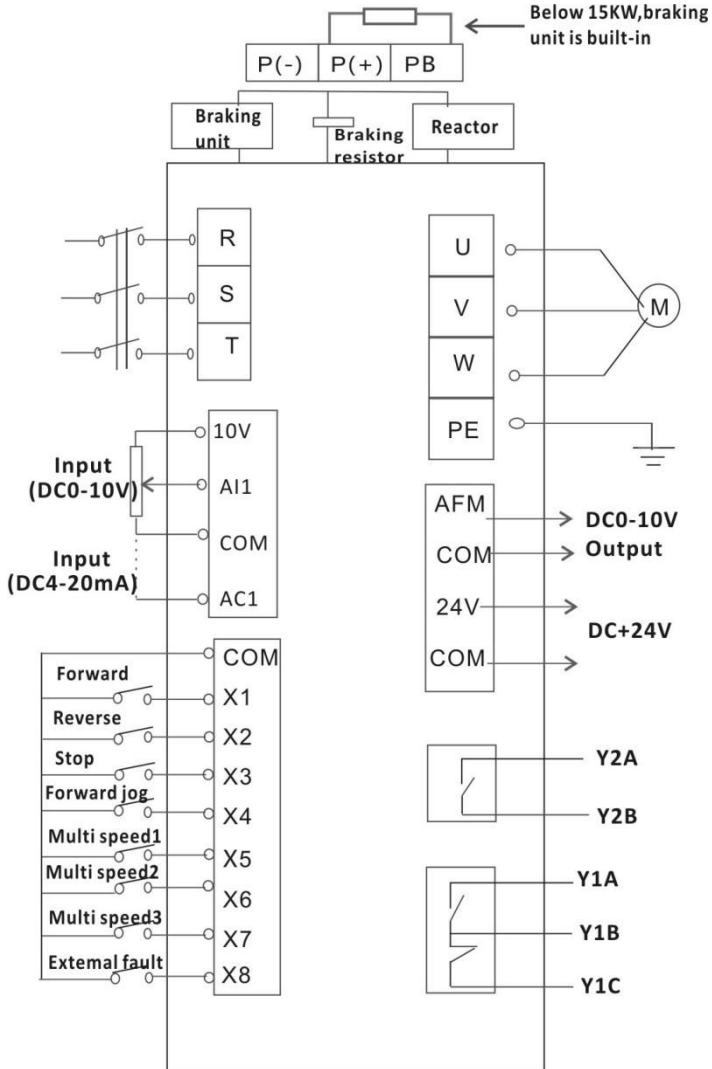
2.4.1   Main Loop Terminals

Terminal Mark	Terminal Name	Explanation
L,N	AC power input	Connect to the power frequency supply Single-phase AC 220V 50-60Hz
R, S, T		AC230V or 380V 50-60Hz
U, V, W	Inverter output	Connect to three phase asynchronous motor
P+, PB	Connect to braking resistor	Connect braking resistor between P+ and PB (below 15KW)
PE	Grounding	Inverter grounding, must be properly grounded

2.4.2   Control Loop Terminal Explanation

Terminal Mark	Terminal Name	Explanation
AVI	Voltage input set by frequency	Input 0-10V, PID setting or feedback
ACI	Current input set by frequency	Input 4-20mA, PID setting or feedback
AFM	0-10V output	To indicate frequency, current, rotating speed, etc
10V	Auxiliary power supply set by frequency	Connect to potentiometer(4.7K-10K) with AVI and GND
X1	Multi-function terminal 1	Function defined by value of parameter P091, factory default is "forward start"
X2	Multi-function terminal 2	Function defined by value of parameter P092, factory default is "reverse start"
X3	Multi-function terminal 3	Function defined by value of parameter P093, factory default is "stop"
X4	Multi-function terminal 4	Function defined by value of parameter P094, factory default is "forward jog start"
X5	Multi-function terminal 5	Function defined by value of parameter P095, factory default is "multi-step speed 1"
X6	Multi-function terminal 6	Function defined by value of parameter P096, factory default is "multi-step speed 2"
X7	Multi-function terminal 7	Function defined by value of parameter P097, factory default is "multi-step speed 3"
X8	Multi-function terminal 8	Function defined by value of parameter P098, factory default is "external fault"

| Y2A、Y2B	Relay contactor output	Y2A and Y2B are normally open contactors.
Y1A、Y1B、Y1C	Relay contactor output	Y1A and Y1B are normally open contactors,Y1B and Y1C are normally closed contactors.
COM、12V	Auxiliary power supply	COM, +24V≤50mA, COM are common position for analog input/output and multi-function terminals.

2.4.3   Main Loop Connection

1. The crimping terminals for power supply or motors must be with insulation tube.
2. Keep in mind that NEVER connect power supply to output terminals of inverter (U, V, W), otherwise it will damage inverter.
3. After wiring is finished, odd wires must be cleaned up, otherwise they may cause abnormal performance, failure or fault. When boring on control stand, be aware to prevent the fragments and powders from entering into inverter.
4. To keep the voltage drop within 2%, please use proper electric wires for wiring. When the distance between inverter and motor is long, especially under the condition of low frequency, motor torque will decline due to the decrease of main loop wire voltage.
5. Maximum line distance is 500m, especially for long-distance wiring. Because the parasitic capacitor generates surge current, which may cause current protection, there will be the abnormal performance and faults of the devices connected to output terminal. Therefore, please refer to the maximum wiring distance as below (when inverter connects two or more motors, wiring distance shall be within 500m):

Inverter Capacity	Below 0.75KW	2.2KW	Above 4.0KW
Non-ultra-low noise mode	100m	150m	200m
Ultra-low noise mode	50m	80m	100m

6. It is recommended to connect optional braking resistor between P+ and B- terminals.
7. Electromagnetic wave interference: there is harmonic wave in inverter input & output circuits. In high-demanding circumstances please install wireless noise filter on input terminal, to minimize the interference.
8. On inverter output terminal, DO NOT install power capacitor, surge suppressor or wireless noise filter, which will lead to inverter fault or component damage.
9. When wiring change is required while power is on or inverter is running, inverter operation must be stopped then wait for over 10 minutes after power is cut off.   Check the voltage by multi-meter then make the wiring change. There is still dangerous high voltage on capacitor within a period after power is cut.
10. Ground terminal must be well grounded.
    ▲Since there is leakage current in inverter, in order to avoid electric shock, inverter and motor must be grounded.
    ▲Use independent terminal for inverter grounding. DO NOT just use screw on shell or

chassis instead.
▲ It is recommended to adopt thick cable with demanded diameter no smaller then in the attached form. Grounding wire should be near inverter, and ground wire be as short as possible.
▲ When the motor is grounded on inverter side, please use one core of the four-core cable to ground, with the same size to input wire.

The best method   Ok, but not so good
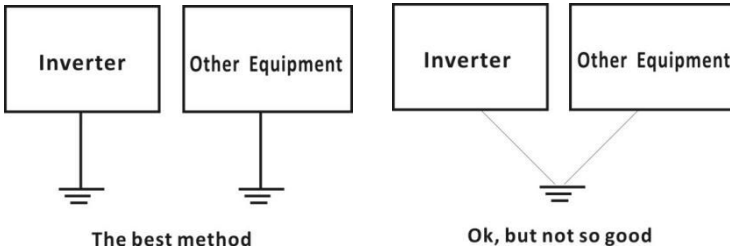
2.4.4   Inverter Main Loop Terminal Row:

0.75KW-1.5KW, single phase 220V：

	L	N	PE	U	V	W	PB	P+
	L	N	PE	U	V	W	PB	P+

2.2KW-3.7KW, single phase 220V：

L	N		PB	P+	U	V	W	PE
L	N		PB	P+	U	V	W	PE

5.5KW, single phase 220V：

L	N		PB	P+	P-	U	V	W	PE
L	N		PB	P+	P-	U	V	W	PE

0.75KW-2.2KW, three-phase 380V:

R	S	T	PE	U	V	W	PB	P+
R	S	T	PE	U	V	W	PB	P+

3.0KW-5.5KW, three-phase 380V:

R	S	T	PB	P+	U	V	W	PE
R	S	T	PB	P+	U	V	W	PE

7.5KW, three-phase 380V:

P-	P+	PB	R	S	T	U	V	W	PE
P-	P+	PB	R	S	T	U	V	W	PE

11KW-15KW, three-phase 380V:

P-	P+	PB	R	S	T	U	V	W	PE
P-	P+	PB	R	S	T	U	V	W	PE

18.5KW, three-phase 380V:

R	S	T	P+	P-	U	V	W	PE
R	S	T	P+	P-	U	V	W	PE

Notes：
- Different models may have some changes, please in kind prevail!
- Inverter terminals (P+ , P-) shall be in accordance with braking unit terminal symbol during wiring, damage will caused if wrongly connected.
- The wire distance between braking unit and braking resistor unit shall be kept within 5 meters, or within 10 meters if using twisted pair.

● If the transistor in braking unit is damaged (short circuit), resistor will be very hot which is easy to cause fire. Therefore, installing electromagnetic contactor on inverter input terminal is recommended because it allows cutting off power when fault occurs.

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① INFORMATION

● Cable must be of 75°C copper.
● Screw with proper strength. Loose screwing will lead to short circuit or wrong operation while over-tight screwing will result in damages to screws and terminals, and short circuit or wrong operation too.

2.4.5 Control Loop Connection

1. Terminal "COM"is the common terminal for control,please DO NOT ground the common terminal.
2. The wiring of control loop should adopt shielded wire or twisted wire,meanwhile, it must be wired separately from main loop and strong electricity loop.
3. Because the frequency input signal of control loop is tiny current, please use two side-by-side contacts or twincontacts to avoid poor contact.
4. It is recommended to use 0.75mm cable for wiring control loop.
5. High voltage CANNOT be input into control loop, otherwise it will damage inverter.

2.4.6 Inverter Control Loop Terminal Row

| 10V	AVI	COM	ACI	AFM	Y2A	Y2B	Y1A	Y1B	Y1C
COM	X1	X2	X3	X4	X5	X6	X7	X8	+24V

Notes: Different models may have some changes, please in kind prevail!

CHAPTER 3   KEYPAD OPERATION

This chapter provides guidance for basic "running operation", please read it carefully in detail before using the inverter.

3.1   Operation Keypad 1

Operation Keypad is the connector for communication between human and equipment, which is composed of key part and display part. User inputs control commands through keys, and display part shows parameter information and different running conditions. Keypad appearances are as below:
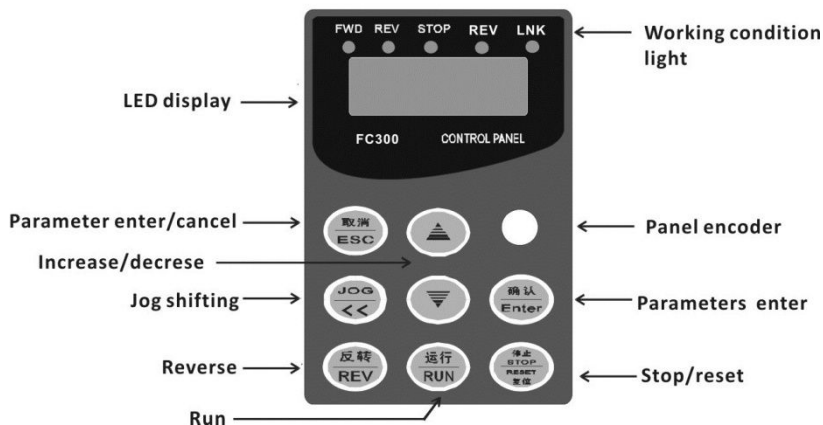
3.1.1   Operation Keypad Explanation

Symbol	Key Name	Function
运行 RUN	RUN	Press this key to start running. If it is set as controlled by external terminal, pressing this key is invalid.
反转 REV	REVERSE	Press this key to start reverse running. If it is set as controlled by external terminal or "P067"as 0, reverse running is not allowed.
停止 STOP RESET 复位	STOP/RESET	Press this key to stop running. If it is set as external terminal control, pressing this key is invalid. Press this key to reset after default alarming.

取消 ESC	ESCAPE	Press this key to enter into function setting state. Press this key to exit function setting after modification.
确认 ENTER	ENTER	Under function setting state, press this key to find the target function code. After modification, press this key again to save the revised information; under standby or running states, press this key to show DC voltage, output current, temperature, etc. Refer to chapter 3.3 for more details.
INCREASE	INCREASE	Press this key to increase the number for function code or parameter data. Under running or standby states, press this key to increase running frequency.
DECREASE	DECREASE	Press this key to decrease the number for function code or parameter data. Under running or standby conditions, press this key to decrease running frequency.
JOG	JOG	Under function setting state, pressing this key can make shift. Under standby state(P025=1), press this key to initiate jog function.
Potentiometer	Potentiometer	Similar to increase/decrease keys, to control inverter running frequency.

3.1.2　Display Content Explanation

A. Condition Light Explanation

Display Content	Condition	Explanation
FWD	Light	Indicates the motor is forward running
REV	Light	Indicates the motor is reverse running
STOP	Light	Indicates the motor is in stop state

B. Unit Light Explanation

Display Content code	Function
H	rated frequency
F	output frequency
A	output current
U	bus voltage
u	output voltage
r	motor rotating speed
y	PID setting
L	PID feedback

J	present count value
d	factory test reservation

3.1.3   Operation Keypad Explanation

If parameters need modification, first you shall enter into the function code which requires modification, then reset the parameter. Refer to details as below:

Sequence	Operation	Explanation
1	取消 ESC	Enter into function setting state, inverter displays present parameter number, e.g. "P000".
2	▼ ▲	Adjust to the required parameter number, e.g. "P087".
3	确认 ENTER	Inverter displays the value of present parameter, e.g."0".
4	▲ ▼	Adjust to the required value, e.g. "101".
5	确认 ENTER	confirmthis operation and save the data.
6	取消 ESC	Exit the setting state and back to standby or running state.

Notes:
● Press "ESC" and enter into function setting state, if "ESC" is kept been pressing for more than 3 seconds before being released, inverter will enter into special mode in which it can only display and modify Non-factory parameters (which were modified from factory parameters before).
● When setting parameters, pressing "ESC"key can exit parameter setting state and back to standby mode.

3.2   Operation Keypad 2
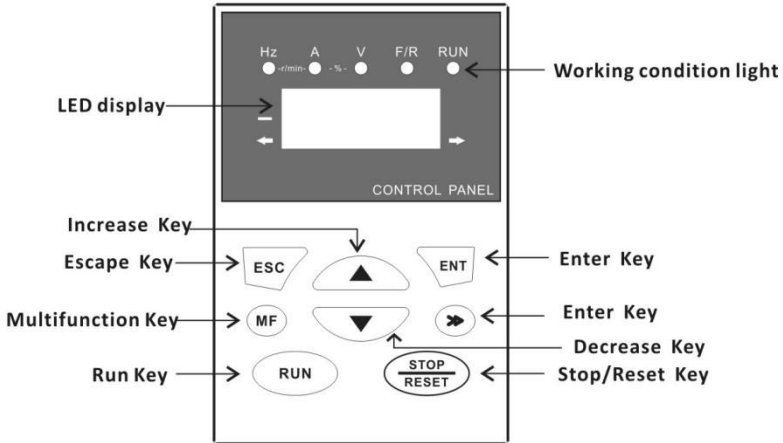
3.2.1   Operation Keypad Explanation

Symbol	Key Name	Function
RUN	Run key	Inverter starts running once this key is pressed. This key is invalid when inverter is in external control mode.
STOP RESET	Stop/Reset Key	Inverter stops running when this key is pressed; Reset inverter by this key under fault alarm.
MF	Multifunction key	Refer to parameter P70.00.
ESC	Escape Key	Escape function setting condition.
ENT	Enter Key	Function parameter edition enter; Confirmation/saving of parameter setting.
Increase Key symbol	Increase Key	Increase of selectedfunction code value; Increase of selected parameter code value; Increase of set frequency.
Decrease Key symbol	Decrease key	Decrease of selected function code value; Decrease of selected parameter code value; Decrease of set frequency.

	Shift key	Selection of function code value; Selection of parameter value; Selection of stop/run status display parameters; Refer to 3.3 for details.

3.2.2   Display Content Explanation

A. Condition Light Explanation

Condition Light	Light Name	Explanation
RUN	Running condition Indication	ON: Run OFF: Stop Flash: Stopping
F/R	Reverse Indication	ON: Reverse command initiates under stop condition; Inverter reverses under running condition. Flash: Shifting from Reverse to Forward.

B. Unit Light Explanation

Condition Light	Name	Explanation
Hz	Frequency Indication	ON: Present displayed parameter is running frequency or present function unit is frequency; Flash: Present displayed parameter is set frequency.
A	Current Display	ON: Present displayed parameter is current.
V	Voltage Indication	ON: Present displayed parameter is voltage.
Hz+A	Rotating Speed Indication	ON: Present displayed parameter is rotating speed; Flash: Present displayed is set rotating speed.
A+V	Percentage Indication	ON: Present displayed parameter is percentage.

### 3.2.3   Parameter Modification Method

If parameters need modification, first you shall enter into the function code which requires modification, then reset the parameter. Refer to details as below:

Sequence	Operation	Explanation
1	ENT	Enter into parameter menu, e.g. P00-00, inverter displays present parameter's first level menu.

2	⏩	Adjust to the parameter which requires modification, e.g. P00-00.
3	▲ ▼	Adjust to the required parameter code, e.g. P10-00.
4	ENT	Inverter displays the value of present parameter, e.g. "0".
5	▲ ▼	Adjust to the required value, e.g. "1".
6	ENT	Confirm this operation, save information.
7	ESC	Exit parameter setting condition, back to standby or running condition.

Note: When setting parameters, pressing "ESC" key can exit parameter setting state and back to standby mode.

3.3   Commissioning

3.3.1   Important inspection Before Running

- Whether exists wrong wiring, especially check whether the power supply is wrongly connected to U.V.W terminal;
- Please pay attention: power supply should be input from R.S.T(L.N) terminals;
- Whether there are metal chips or wires, which may cause short-circuit, left on inverter base board and wiring terminals;
- Whether screws are tightly screwed, whether connectors are loose;
- Whether there is short-circuit or short-to-ground on output part.

3.3.2   Commissioning Method

Because the control method of FC300 series is set as control panel method before out of factory, therefore, commissioning can be carried out by operating JOG key on the panel. Normally commissioning is operated under 5.0Hz.

CHAPTER 4   DETAILED PARAMETER DESCRIPTION

Parameter Number	Function	Explanation	Factory Value
P000	Inverter model code identification	Setting range: 0, 0.75KW/220V ; 1, 0.75KW/380V ; 2, 1.5KW/220V ; 3, 1.5KW/380V; 4, 2.2KW/220V ; 5, 2.2KW/380V ; 6, 3.0KW/220V ; 7, 3.0KW/380V ; 8, 3.7KW/220V ; 9, 3.7KW/380V ; 10, 5.5KW/220V ; 11, 5.5KW/380V ; 12, 7.5KW/220V ; 13, 7.5KW/380V ; 14, 11KW/220V ; 15, 11KW/380V ; 16, 15KW/220V ; 17, 15KW/380V ; 18, 18.5KW/220V ; 19, 18.5KW/380V.	Factory setting, only for reading
P001	MotorRatedcurrent	Setting range:20 -110% inverter current, depends on the rated current of actual used motor. When the inverter drives two or more motors, there's no motor protection, so please install thermal protection relay for motors in this case.	Dependi-ng on motor model
P002	Motor rated voltage	Setting range:50-460V Set in accordance with the rated voltage of the actual used motor.	220V (380V)
P003	Motor rated frequency	Setting range: 20.0-1000.0Hz Set in accordance with the rated frequency of the actual used motor.	50.0Hz
P004	Motor no-load current	Setting range: 20%-50% The ratio of motor no-load current to motor rated current will influence the slip compensation amount.	40
P005	Reserved		
P006	Reserved		
P007	Torque boost	Setting range: 0-30% (depending on motor model) This parameter sets the lowest starting voltage of V/f curve. Setting this parameter properly can improve the starting torque at low frequency.	Dependi-ng on motor model
P008	Reserved		
P009	Reserved		
P010	Reserved		
P011	Reserved		

P012	Starting frequency	Setting range: 1.0Hz-highest operation frequency When inverter is starting, frequency accelerates from this frequency to target frequency. If this valueis set too big, it may cause overcurrentprotection.	1.0
P013	Starting delay	Setting range: 0.0—600.0S When inverter is starting, it remains the starting frequency for this set time, and then accelerates to target frequency. This function is to improve the starting characteristics of motor, to ensure the motor can fully start within set time.	0.0
P014	Stopping method	Setting range: 0, DC braking after deceleration; 1, Free stop. This function is to choose the motor stopping method. When choosing deceleration stopping method, after receiving the stop commands, inverter decelerates to DC braking starting frequency P015, then brakes and stops according to P018 DC braking voltage and P017 stop braking time; when choosing free stop method, inverter instantly cuts off output and motor gives a free inertia stop.	0
P015	Starting frequency of DC braking	Setting range: 1.0-1000.0Hz After stopping, inverter decelerates to this frequency and then starts DC braking.	3.0 Hz
P016	Braking time before starting	Setting range: 0.0-600.0 S When motor begins starting, first it DC brakes for this set time and then accelerates to target frequency.	0.0S
P017	Stopping braking time	Setting range: 0.0-600.0S	0.0S
P018	DC braking voltage	Setting range: 0-30%(depending on motor model) It's the output voltage under DC braking. When setting this parameter, the value must be increased gradually from time to time, till getting enough braking torque.	1
P019	Reserved		
P020	Reserved		
P021	Highest frequency	Setting range: lowest operation frequency-1000.0Hz Set the highest frequency which is allowed by the motor. All the operation frequencies are limited by this frequency.	60.0Hz
P022	Lowest operation frequency	Setting range: 0.0 Hz-highest operation frequency Set the lowest operation frequency.	0.0Hz

P023	Lowest output frequency	Setting range:0.0 Hz-highest operation frequency Set the lowest inverter output frequency which the motor allows. If running frequency is set lower than this frequency, inverter stops output.	1.0Hz
P024	Reserved		
P025	Keypad jog control	Setting range: 0, Forbids keypad jog operation; 1, Allows keypad jog operation.	1
P026	Jog frequency	Setting range: lowest operation frequency-highest frequency Set the frequency value inverter outputs when receiving jog commands.	5.0Hz
P027	Jog relative parameters	This parameter consists of four hexadecimal digits, each of which represents a different function. D0: Jog direction control 0, Forward; 1, Reverse; 2, (others), forward and reverse both allowed. D1: Jog acceleration & deceleration time choice 1-4, respectively correspond to first to fourth acceleration & deceleration time; 0, (orothers), chosen by external control signal.	0002
P028	Reserved	Reserved	
P029	Reserved	Reserved	
P030	First frequency	Settingrange: lowest operation frequency-highest frequency When speed command (P064) is 0, this frequency is involved in running as the first frequency. This parameter can be modified by▲▼keys on operation panel directly, with automatic memory when power is off.	50.0Hz
P031	Second frequency	Setting range:lowest operation frequency-highest frequency	2.0Hz
P032	Third frequency	Setting range:lowest operation frequency-highest frequency	3.0Hz
P033	Fourth frequency	Setting range:lowest operation frequency-highest frequency	4.0Hz
P034	Fifth frequency	Setting range: lowest operation frequency-highest frequency	5.0Hz
P035	Sixth frequency	Setting range:lowest operation frequency-highest frequency	6.0Hz

P036	Seventh frequency	Setting range:lowest operation frequency-highest frequency	7.0Hz
P038	First acceleration time	Setting range:0.1-3000.0S This parameter is to set the needed time for inverter to increase output frequency from 0 to highest frequency.	10.0
P039	First deceleration time	Setting range:0.1-3000.0S This parameter is to set the needed time for inverter to decrease output frequency from highest frequency to 0.	10.0
P040	Second acceleration time	Setting range:0.1-3000.0S	10.0
P041	Second deceleration time	Setting range:0.1-3000.0S	10.0
P042	Third acceleration time	Setting range:0.1-3000.0S	10.0
P043	Third deceleration time	Setting range:0.1-3000.0S	10.0
P044	Fourth acceleration time	Setting range:0.1-3000.0S	10.0
P045	Fourth deceleration time	Setting range: 0.1—3000.0S	10.0
P046	Frequency acceleration & deceleration speed control by keypad	Setting range: 0-100. When the frequency is adjusted by ▲▼keys on keypad, frequency acceleration speed can be slowed down by decreasing this parameter value.	
P047	Frequency acceleration & deceleration time interval	Setting range: 1-2000. When frequency is adjusted by external control terminal, frequency acceleration speed can be slowed down by increasing this parameter value.	
P048	Frequency memory	Setting range: 0,No memory 1, With memory 2,Memory for the latest frequency before starting. To set whether first frequency (P030) is memorized after power-off.	1
P049	Power-down settlement	Setting range: 0, Reporting undervoltage and locking;	0

		1,Reportingundervoltage and automatically resetting without startingafter power-on again; 2, Deceleration stop when nearing undervoltage; 3, Reserved; 4, Reserved. To set inverter action when power is down and when it restarts.	
P050	Control panel quick setting	0,when PID function is valid, set quick setting as PID target value (P122); otherwise as first frequency (P030) 1, quick setting sets as count preset(P127)	
P051	Overheat protection A/D value	Setting range: 0-1023. It is calculated from the data of the NTC temperature sensor of inverter and overheat protection data. Factory setting, only for reading.	
P052	Reserved		
P053	Analog output choice	Setting range: 0,Inverter analog output frequency, 0-highest frequency is correspondingto 0-10V; 1,Inverter analog outputcurrent, 0-inverter rated current x 2 is corresponding to 0-10V; This function is to long-distance detect inverter's output frequency or current by connecting one DC voltmeter or other device between AFM and COM terminals. Highest output voltage of AFM terminal is 10V. 2,Inverter analog output voltage, 0-inverter rated voltage x 2 is corresponding to 0-10V.	0
P054	Minimum analog corresponding output	Setting range: 0.00—3.00V To set the value of terminal signal when under minimum analog (0Hz or 0A).	0.0
P055	Maximum analog corresponding output	Setting range: 5.00—20.00V To set the value of terminal signal when under maximum analog (Highest frequency or inverter rated current x 2). This parameter is to modify the value of analog output. Highest output voltage of AFM terminal is 10V.	10.00
P056	Starting-up display choice	Setting range: 0, Frequency (H,F) 1, Motor current (A) 2, Bus voltage(U) 3, Output voltage(u) 4,Approximate mechanical speed=outputfrequency x rotating speed/frequency ratio (r) 5, PID setting(y)	0

		6, PID feedback(L) 7, Count value(J) 8, Factory test reservation (d)	
P057	Rotating speed/frequency ratio	Setting range: 0.01—100.00 This function is to set the ratio between displayed speed value and running frequency, in order to make speed displayed value in accordance with actual speed.	30.00
P058	Carrier wave frequency	Setting range: 0-5 respectively represent 3K, 5K, 7K, 9K, 11K, 13K For versions later than version 1.7: 1-10kHz The higher carrier wave, the lower motor noise, the bigger electromagnetic interference, the more inverter heating, the more leakage current, the lower efficiency. The effect is reverse when carrier wave is lower.	1
P059	Arbitrary frequency arrival setting	Setting range: 0.0—1000.0Hz When inverter output frequency exceeds this set value, inverter can outputs signals through multi-functional terminals.	0.0Hz
P060	Reserved	Reserved	
P061	Hopping frequency starting point	Setting range: 3.0-100.0Hz It is to avoid mechanical resonance point.	20.0
P062	Hopping frequency width	Setting range: 0.0-5.0Hz It is to avoid mechanical resonance point.	0.0
P063	Undervoltage protection	Setting range: 220V: 150-250VDC; 380V: 300-450VDC.	170 (320)
P064	Frequency command resource setting	Setting range: 0, Operation panel digital setting; 1, AVI terminal 0-10V setting; 2, ACI terminal 4-20mA setting; 3, Operation panel digital setting, if 0-10V signal is detected from AVI terminal, shift to 4 automatically; 4, AVI terminal 0-10V setting, when AVI signal is 0, if panel▲▼operation is detected, shift to 3 automatically.	3

P065	Running command resource setting	Setting range: 0, Operation panel control 　(forward starting, reverse starting, stop); 1, External terminal control 　(forward/stop, reverse/stop); 2, External terminal control 　(forward/stop, reverse/stop); 3, External terminal control 　(forward starting, reverse starting, stop (normally close)); 4, External terminal control 　(forward starting, reverse starting, stop(normally open)); 5, Above 0-3 auto-adaptation. This function is to choose the control method of inverter starting and stopping. In below explanation, X1 terminal is assumed to be forward, X2 to be reverse, X3 to be stop. When operation panel control (0) is chosen, external terminal control turns invalid. Forward starting key RUN, reverse starting key REV, stopping key STOP are used to control motor starting and stopping. When external terminal control (1) is chosen, when X1(forward) switches on COM, forward starting; switches off, stop. When X2(reverse) switches on COM, reverse starting; switches off, stop. When external terminal control (2) is chosen, when X1(forward) switches on COM, starting; switches off, stop. When X2(reverse) switches on COM, reverse starting; switches off, forward. When external terminal control (3) is chosen, X3(stop) and COM are connected to stop button normally close contactor, X1(forward) and COM are connected to forward button normally open contactor, X2(reverse) and COM are connected to reverse button normally open contactor. When external terminal control (4) is chosen, X3(stop) and COM are connected to stop button normally open contactor, X1(forward) and COM are connected to forward button normally open contactor, X2(reverse) and COM are connected to reverse button normally open contactor. When 0-3 auto-adaptation (5) is chosen, inverter can work in all conditions 0-3. Notice: X1 and X2 are both connected to COM, motor reverse rotating is initiated. Special caution: Under conditions in which human safety, production loss or equipment damage are possibly caused, please set this parameter correctly to avoid accidents.	5

P066	Rotating direction control	Setting range: 0,Forward, no matter running command is forward or reverse, motor outputs forward 1,Reverse, no matter running command is forward or reverse, motor outputs reverse. 2,Forward and reverse are both allowed. If running command is forward, motor outputs forward; if running command is reverse, motor outputs reverse. To set the running direction of motor, with automatic memory after power-off. Forward & Reverse trigger function will change this parameter.	2
P067	Reverse control	Setting range: 0, Forbids the reverse of motor; 1, Allows the reverse of motor; 2,Allows the reverse of motor, and allows keypad to start the reverse; It is to limit reverse, under the conditions where motor reverse is not allowed, this parameter shall be set as 0 to avoid accidents.	1
P068	Reserved		
P069	Special function 1	This parameter consists four hexadecimal digits D3, D2, D1, D0, each of which represents a different function. D0, D1: Reserved; D2, Program running resetting mode; 0, Once inverter is starting up it runs from First Speed; 1, Once inverter is starting up it runs from the latest speed before inverter stopping. After resetting by external terminals, inverter runs from First Speed. D3, 10V adjustment; 0, Output 10V, 1-F, output 1/16 – 15/16.	
P070	Special function 2	This parameter consists four hexadecimal digits D3, D2, D1, D0, each of which represents a different function. D0, Reserved; D1,Multi-section speed command with forward command attached: 0, Unattached; 1, Unattached. D2, AVI,ACI analog controlling forward and reverse: 0, Invalid; 1, Valid. > 50% is forward. D3, Automatic increment acceleration control of operation panel potentiometer: the smaller the setting, the faster the acceleration.	0x4000
P071	Fault record 1	0, No fault	0

		1, Highly overcurrent (HoC) 2, Overcurrent (Oc) 3, Overvoltage (oU) 4, Undervoltage (LU) 5, Overload (oL) 6, Overheat (oH) 7, External fault (EF) 8, EEP error (EEP) 9, Data error (dEr) 10, CPU fault (CPU) 11, Code error (CodE) 12, Input phase loss (LP) 13, Output phase loss (oP) 14, Reserved	(only for reading) Note: fault records are not revisable , so testing record may be left before delivery.
P072	Fault record 2	(Same as above)	0
P073	Fault record 3	(Same as above)	0
P074	Accumulated turned-on time	(day)	(read only)
P075	Reserved		
P076	Reserved		
P077	Reserved		
P078	Reserved		
P079	Reserved		
P080	Reserved		
P081	Reserved		
P082	Reserved		
P083	Reserved		
P084	Reserved		
P085	Reserved		0
P086	User password	Setting range: 0-65535。 0: invalid; 65535; invalid; When there is no password set, set P086 as a new password and set P087 as 2, then the password becomes valid. When there is some password set already, user shall input the right password at P086 then this parameter can be modified. Afterwards if set P087 as 3, the password is cleared.	0

P087	Special operation	User can carry out some special operations by setting this function. It will automatically reset to 0 after the operation, with no memory. Setting range: 0, No operation; 1, Reset to factory value; 2, Memorize user password; 3, Clear user password; 4, Upload parameter; 5, Download parameter;(Notice: download available only when software versions are the same; user needs to consider compatibility when copying between different power and models) Others: reserved, cannot be set freely.	0
P088	Discharging starting voltage of braking resistor	Setting range: 220V inverter: 350—400V 380V inverter: 650—720V	360V or 660V
P089	Anti-overvoltage response point	Setting range: 220V inverter: 350—420V 380V inverter: 650—760V	380V or 730V
P090	Anti-overcurrent response point	Setting range: 100—190% x motor rated current	150
P091	X1 function choice	Setting range: 0, No operation 1, Multi-section speed 1(annexed table 1); 2, Multi-section speed 2 (annexed table 1); 3, Multi-section speed 3(annexed table 1); 4, Frequency rise; 5, Frequency decline; 6, Forward jog; 7, Reverse jog; 8, Forward; 9, Reverse; 10, Forward trigger; 11, Reverse trigger; 12, Stop; 13, Free stop; 14, Mandatory stop; 15, Mandatory reverse; 16, Counter zero; 17, Counter input; 18, Program running reset; 19, External fault; 20, External reset; 21, Acceleration & deceleration time choice 1; (annexed table 2) 22, Acceleration & deceleration time choice 2;	8

		(annexed table 2) 23, Acceleration & deceleration pause; 24, Compulsory ACI channel is valid.	
P092	X2 function choice	(Same as above)	9
P093	X3 function choice	(Same as above)	12
P094	X4 function choice	(Same as above)	6
P095	X5 function choice	(Same as above)	1
P096	X6 function choice	(Same as above)	2
P097	X7 function choice	(Same as above)	3
P098	X8 function choice	(Same as above)	19
P099	Reserved		
P100	Reserved		
P101	Y1 Function choice	Setting range: 0, No action; 1, Running; 2, Target frequency arrival; 3, Arbitrary frequency arrival; 4, Fault; 5, Undervoltage; 6, Count arrival; 7, Count arrival & warn; 8, Stopping; 9, Motor direction change delay.	4
P102	Y2 Function choice	(Same as above)	4
P103	Y3 Function choice	(Same as above)	4
P104	Reserved		
P105	Reserved		
P106	AVI analog input filtering	Setting range: 0.01-2.00	0.30
P107	ACI analog input filtering	Setting range: 0.01-2.00	0.30

P108	Corresponding analog output of highest frequency (PID biggest target value)	Setting range: 0—100% It is to set the corresponding relation between analog and target frequency (PID target value). E.g. When AVI terminal inputs 10Vx98%=9.8V, frequency reaches highest frequency (P021)	98
P109	Corresponding analog output of lowest frequency (PID smallest target value)	Setting range: 0—100% It is to set the corresponding relation between analog and target frequency (PID target value). E.g. When AVI terminal inputs 10V x 2%=0.2V, frequency reaches lowest frequency (P022)	2
P110	Reserved		
P111	Reserved		
P112	Running mode	Setting range: 0, Common running 1, PID mode, target value is set by operation panel, AVI terminal inputs feedback; 2, PID mode, target value is set by operation panel, ACI terminal inputs feedback; 3, Target value is set by AVI terminal, ACI terminal inputs feedback.; 4, Target value is set by ACI terminal, AVI terminal inputs feedback; 5-9, Reserved; 10, Program runs, then stops after one single circle; 11, Program runs, then runs at the latest speed after one single circle; 12, Program runs, then runs in round trip.. This parameter is to choose the running mode of inverter.	0
P113	PID maximum target value	Setting range: minimum target value-10000 This function is to set the maximum target value during PID running. The decimal point position on operation panel can be set on P121.	10000
P114	PID minimum target value	Setting range: 0-maximum target value. This function is to set the minimum target value during PID running.	0
P115	Corresponding feedback to PID maximum target value	Setting range: 0—100% It is to set the corresponding sensor feedback to maximum target value.	100
P116	Corresponding feedback to PID minimum target value	Setting range: 0—100% It is to set the corresponding sensor feedback to minimum target value.	0

P117	Proportionality factor	Setting range: 0.01—10.00 When this factor value is big it gives a quick response, but if it is too big it may cause oscillation. When this factor value is small, it gives a slow response.	1.00
P118	Integration factor	Setting factor: 0.01—10.00 When this factor value is big it gives a quick response.	0.50
P119	Differential factor	Setting range: 0.01—10.00 When this factor value is big it gives a quick response, but if it's too big it may cause oscillation. When this factor value is small, it gives a slow response.	0.50
P120	Feedback sampling cycle	Setting range : 0.1—20.0S This factor sets the interval time for next response under PID controller.	0.3
P121	PID relative parameters	This parameter consists four hexadecimal digits D3, D2, D1, D0, each of which represents a different function. D0, Decimal place setting of PID displayed value : Setting range: 0-3 D1, Relation between motor speed and feedback 0, when motor rotating speed rises, feedback value increases; 1, when motor rotating speed rises, feedback value decreases.	0x0002
P122	PID target value	Setting range: PID minimum target value-PID maximum target value. Automatic memory when power-off.	5000
P123	Reserved		
P124	Reserved		
P1125	Reserved		
P126	Present count value	Setting value: 0—65000 This parameter sets the present count value of counter. External counting pulse signal makes this parameter increase.	0
P127	Count preset	Setting : 0—65000 This function is to set the preset value of counter. When count value equals to count preset value, system acts according to P129.	100
P128	Count & warn	Setting range: 1—65000 This function is for setting a warning value of counter, to prepare for next work procedure before count arrival. When count reaches warning value, system outputs signal through terminal.	90
P129	Count arrival choice	Setting range: 0, shut off output;	0

		1, continue output.	
P130	Time unit of program running	Setting range: 0, Second; 1, Minute; 2, Hour.	
P131	Running at first speed	Setting range: 0-6553.0	
P132	Running at second speed	Setting range: 0-6553.0	
P133	Running at third speed	Setting range: 0-6553.0	
P134	Running at fourth speed	Setting range: 0-6553.0	
P135	Running at fifth speed	Setting range: 0-6553.0	
P136	Running at sixth speed	Setting range: 0-6553.0	
P137	Running at seventh speed	Setting range: 0-6553.0	
P138	Running at eighth speed	Setting range: 0-6553.0	

P139	First speed-related parameter	This parameter consists of four hexadecimal digits D3, D2, D1, D0, each of which represents a different function.
		D0, direction control;
		  0, Forward;
		  1, Reverse;
		  2, (others), forward and reverse both allowed
		D1, acceleration & deceleration time choice
		  1-4, respectively correspond to first to fourth acceleration & deceleration time;
		  0 (others), chosen by external control signal.
			0x0002

P140	Second speed-related parameter	(Same as above)	0x0002
P141	Third speed-related parameter	(Same as above)	0x0002
P142	Fourth speed-related parameter	(Same as above)	0x0002
P143	Fifth speed-related	(Same as above)	0x0002

	parameter		
P144	Sixth speed-related parameter	(Same as above)	0x0002
P145	Seventh speed-related parameter	(Same as above)	0x0002
P146	Eighth speed-related parameter	(Same as above)	0x0002
P147	Reserved		
P148	Reserved		
P149	Reserved		
P150	Communication configuration	This parameter consists of four hexadecimal digits D3, D2, D1, D0, each of which represents a different function. D1, D0 host address: two hexadecimal digits represent host address, range 01-FF, i.e. decimal 0-255. D2, Baud rate; 0: 4800 1: 9600 2:19200 3:38400 D3, Data format; 0: 1-8-2 format, no verification 1:1-8-1 format, even verification 2: 1-8-1 format, odd verification	
P151	Reserved		
P152	Reserved		
P153	Reserved		
P154	Reserved		
P155	Reserved		
P156	Reserved		
P157	Reserved		
P158	Reserved		
P159	Reserved		

Notes: 1. Some models don't possess X5-X8，Y1-Y3，AVI，ACI，AFM terminal functions, etc.
Please refer to specific models or consult your sales representative.
2. Some of the parameters cannot be modified during motor running.

Table 1: Corresponding relation between multi-section speed 1, 2, 3 on-off state and frequency

Multi-section speed 3	Multi-section speed 2	Multi-section speed 1	Target frequency
OFF	OFF	OFF	First frequency
OFF	OFF	ON	Second frequency
OFF	ON	OFF	Third frequency
OFF	ON	ON	Fourth frequency
ON	OFF	OFF	Fifth frequency
ON	OFF	ON	Sixth frequency
ON	ON	OFF	Seventh frequency
ON	ON	ON	Eighth frequency

Table 2: Corresponding relation between acceleration & deceleration time choice 1, 2 on-off state and acceleration & deceleration time

Acceleration & deceleration time choice 2	Acceleration & deceleration time choice 1	Target acceleration & deceleration time
OFF	OFF	First acceleration & deceleration time
OFF	ON	Second acceleration & deceleration time
ON	OFF	Third acceleration & deceleration time
ON	ON	Fourth acceleration & deceleration time

CHAPTER 5   DIAGNOSTICS AND TROUBLESHOOTING

Maintaining and checking the inverter on a regular basis can make your inverter's service life longer.

5.1 Precautions for Maintenance

● Make sure inverter power supply is cut off before maintenance and inspection.
● Ensure inverter power supply is cut off, display disappears, and inside high voltage light is off, then maintenance and inspection can be carried out.
● During inspection, pulling up or mismatching internal power supply & wires are forbidden, otherwise it may cause inverter non-operation or damage.
● During installation, parts like screw cannot be left inside inverter, to avoid circuit board short-circuit.
● Keep inverter clean after installation, and prevent dust, oily mist, moisture from entering in inverter.

5.2 Regular Inspections

● Confirm that power supply voltage comply with the voltage inverter needs.
  (check whether there is breakage on power cord and motor)
● Whether wiring terminals and contactors are loose.
  (whether there is strand breakage on power cord and terminal connecting wire)
● Whether there is dust, iron chip and corrosive liquid inside inverter
● Measuring inverter isolation Impedance is forbidden.
● Inspect inverter output voltage, output current, output frequency.
  (too big difference among the measurement results is not allowed)
● Check whether the surrounding temperature is within -5℃~40℃, whether the installation environment provides good ventilation.
● Humidity be kept under 90%.
  (dew condensation is not allowed)
● Whether there is abnormal sound or vibration during running.
  (inverter cannot be positioned in the place where there is severe vibration)
● Please carry out the cleaning job of keeping blowhole through on a regular basis.

5.3   Fault Display and Trouble-Shooting

FC300 series possesses comprehensive protection functions, e.g. overload, short-circuit between phases, undervoltage, overheat, overcurrent, etc. When inverter initiates protection actions, please find out the reasons according to the information in below table. Please do not carry out running operation until the fault is solved. If the fault cannot be solved, please

contact our company.

Fault Display	Fault content and explanation	Solutions
HoC	Inverter severe overcurrent	1, Check whether there is short-circuit or partiall short-circuit on motor, whether the isolation of output wire is in good condition; 2, Prolong acceleration and deceleration time; 3, Inverter configuration is not rational, increase the capacity of inverter; 4, Decrease the set value of torque boost; 5, Check whether there is locked-rotor on motor or mutation on mechanical load; 6, Whether there is mutation of network voltage; 7, Machine fault, needs factory repair; 8,Excessive DC braking, needs to decrease DC braking amount.
OU	Overvoltage	1,Network voltage is too high, check whether there is mutation of network voltage; 2, Whether input voltage is wrong; 3,Excessive load inertia; 4, Deceleration time is too short.
LU	Undervoltage	1, Check whether input voltage is normal; 2, Check whether there is mutation of load; 3, Check whether the line too far or too thin; 4, Whether there is phase loss.
OH	Inverter overheat	1,Check whether there is locked-rotor on fan or foreign matter on cooling fin; 2, Whether the environment temperature is normal; 3, Whether the ventilation space is enough and air convection is available; 4, Check whether temperature sensor is damaged; 5, Inverter fault, needs factory repair.
OL	Overload	1, Check whether inverter capacity is smaller than enough, if yes, increase the capacity; 2, Check whether there is stuck on mechanical load; 3, Improper V/f curve design, needs redesign; 4,Excessive DC braking time while starting or stopping, decrease braking time.
oC	Overcurrent	1, Acceleration time is too short, needs to be increased properly; 2, Excessive motor load; 3, Control panel damage, needs factory repair.
CodE	Code error	Inverter fault, needs factory repair
LP	Input phase loss	Check whether there is phase loss or break wire on input terminal
oP	Output phase loss	Inverter fault, needs factory repair

CPU	CPU fault	Inverter fault, needs factory repair
EEP	Memory error	Needs repair
EF	External fault	External fault, which is inverter input function
oFF	Reserved	
dEr	Parameter setting error	Set parameters correctly

5.4   Diagnostics

5.4.1   Press running key but motor does not rotate.
1. False running mode setting, i.e., start running by operation panel in external terminal control mode, or , start by external terminal in operation panel mode.
2. Frequency command is too low or no frequency command is set
3. False peripheral wiring, e.g. false 2-wire system, 3-wire system and false setting of relative parameters.
4. False setting of multi-functional output terminal (in external terminal control mode)
5. Inverter is in fault protection condition
6. Motor fault
7. Inverter fault

5.4.2 Parameter is not settable.
1. User password is locked. Please unlock it then set parameter.
2. Inverter is under running.
3. Abnormal connector wiring and abnormal digital operator communication.   Disassemble the operator after power-off and assemble it for another try.

5.4.3 Motor cannot reverse.
Check whether P067 is set as 1. If it is set as 0 then reverse is forbidden.

5.4.4 Motor rotates oppositely.
False motor output wiring. Please exchange the connection of any two lines among U, V, W.

5.4.5 Motor deceleration is too slow.
1. Deceleration time is set too long. Decrease deceleration time.
2. Install braking resistor.
3. Add DC braking.

5.4.6 Motor overheat.
1. Load is too big. Actual torque exceeds motor rated torque. It is recommendable to increase motor capacity.
2. Environment temperature is too high. In environment with high temperature, motor will burn out. Please decrease the surrounding temperature.

3.   Motor inter-phase withstand voltage is not big enough.

The switching action of inverter will cause shockwave among motor winding coils. Usually the maximum shockwave voltage may reach 3 times of inverter input power supply voltage. Please choose the motor of which the shockwave withstand voltage is bigger than maximum shockwave voltage.

5.4.7 When inverter starts, it interrupts other controlling devices.
1.   Decrease carrier wave frequency and decrease inside switching action.
2.   Install noise filter on inverter power supply input side.
3.   Install noise filter on inverter output side.
4.   Ground the inverter and motor correctly.
5.   Put on metal tube outside the wire for shielding.
6.   Wire main loop and control loop separately.

5.4.8 Inverter overcurrent stall is detected while fan is starting.
1.   Fan is in idle state while starting. Please set starting DC braking.
2.   If starting DC braking is set, please increase DC braking value.

5.4.9 Mechanical vibration or roar.
1.   Vibration frequency in mechanical system and carrier wave cause resonance. Adjust carrier wave to avoid resonance point.
2.   Vibration frequency in mechanical system and inverter output frequency cause resonance.
      a.   Set hopping function to avoid resonance point.
      b.   Add anti-vibration rubber on motor baseboard.

5.5 Frequent Anomalies and Solutions

Refer to below table for frequent anomalies analysis and solution

Anomalies		Possible reasons and solutions
Motor no rotation	Keypad has no display	Check whether power is down, whether there is phase loss on input power supply, whether input power supply isn't wired correctly.
	Keypad has no display but inside charging light is on	Check whether there is any problem on relative wiring and sockets of keypad. Measure all the controlling power supply voltages inside the inverter to ensure the switching power supply is in normal working condition. If switching power supply does not work normally, check switching power supply inlet wire (P, N) socket whether are connected well, whether starting resistor is damaged or whether VR-tube is normal.
	Cooling fan doesn't work	Switching power supply or rectifying circuit is damaged. Needs factory repair.
	Motor drone	Excessive motor load. Manage to decrease it.

	Non anomaly observed	Check: Whether it is in trip condition or hasn't reset after tripping, Whether in restarting after power-down condition; Whether keypad is has been reset, whether it has entered into program running state, multi-section speed condition, running condition or non-running condition which is set. Please try factory reset.
		Ensure whether running command has been sent out.
		Check whether running frequency is set as 0.
Motor fails to accelerate and decelerate successfully		Improper setting for acceleration & deceleration time; Current limit is set too small; overvoltage protection is initiated while decelerating; Improper setting for carrier wave, excessive load or oscillation occurs.
Motor rotating speed is too high or too low		Improper V/f characteristic setting; False V/f characteristic datum choice. Reset it; Motor rated voltage is irregular or beyond standard; Power supply voltage is too low; Frequency setting signal gain is not set correctly; False setting for output frequency.

CHAPTER 6   RS485 COMMUNICATION PROTOCOL

6.1   Support Protocol

Support Modbusprotocol,RTU mode.Broadcast address 0, slave address can be set as1   255.

6.2   Interface Mode

RS485: asynchronous   half-duplex   the lowest effective bit is sent outby priority.High byteis in front, low byte is at back.

Default data format:1-8-N-2, 38400 bps

Function parameters:P150, Communication configuration.Composed by four hexadecimal digits[D3 D2 D1 D0], default value is 0x0301.

Their respective effects are as below:

D3		D2		D1	D0
Data format		Baud rate			
0	1-8-2 mode, no verification	0	4800	Two hexadecimal digits mean hostaddress, range 01-FF, i.e. decimal 1-255.	
1	1-8-1 mode, even verification	1	9600		
2	1-8-1 mode, odd verification	2	19200		
		3	38400		

6.3   Protocol Format
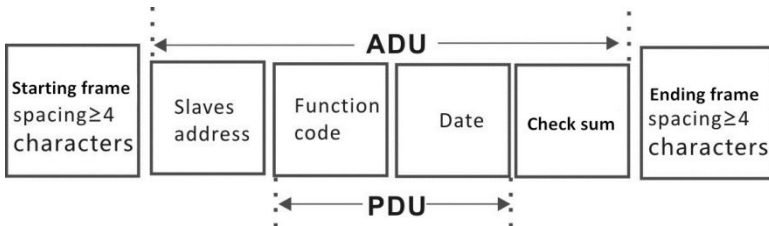
ADU(Application Data Unit) check is obtained through the first three parts of the CRC16 check of ADU and exchanging high and low bytes. When operation request fails   **PDU**   Protocol Data Unit   responds as error code or exception code.Error code is equal to function code **+0x80** while exception code indicates specific error reasons. Examples for abnormal codes are listed below.

Abnormal code	Corresponding meaning
0x01	Illegal function code
0x02	Illegal Address
0x03	Illegal data
0x04	Slave operation failure
0x05	Frame error

6.4   Function Explanation

● Function 0x03: to read several (max. 5 together) multi-functionparameters and status words of inverter.

Content	Data length (bytes)	Range
Request		
Function code	1	0x03
Register Starting Address	2	0x0000 0xFFFF
Register data	2	0x0001 0x0010
Response		
Function code	1	0x03
Read the numbers of bytes	1	2* register quantity
Read the contents	2* register quantity	

● Function 0x06: to rewrite single function code or control parameter of inverter.

Content	Data length (bytes)	Range
Request		
Function code	1	0x06
Register address	2	0x0000 0xFFFF
Register data	2	0x0000 0xFFFF
Response:		
Function code	1	0x06
Register address	2	0x0000 0xFFFF
Function data	2	0x0000 0xFFFF

6.5   Inverter Register Address Distribution

0x0000-0x0fff	Inverter functional parameters
0x8000	Virtual Terminal Low 16-bit
0x8001	Virtual Terminal high 16-bit
0x8100	Inverter status word
0x8101	Set frequency

0x8102	Output frequency
0x8103	Output current
0x8104	Bus voltage
0x8105	Output voltage
0x8106	mechanical rotating speed
0x8107	PID setting
0x8108	PID feedback
0x8109	Current count value

The role of the Virtual Terminal

There is a 32-bit virtual terminal inside of inverter, and its low 16-bit (bit0-bit15) address is 0x8000, high 16-bit (bit16-bit31) address is 0x8001. This virtual terminal and X1-X8 (Specific functions are designated by the parameters) are connected in parallel to have an effect. 32-bit virtual terminal functions respectively correspond to various specific input functions, such as bit8 function is 8-Forward; bit9 function is 9-reversal. Refer to X1-X8 multi-functional inputs.

Inverter status word (0x8100) bit is defined as below:

bit	Meaning
1	0: normal inverter input voltage 1: undervoltage
3	0: non-jog run 1: jog run
4	0: inverter non-reverse run 1: inverter reverse run
5	0: inverter non-forward run 1: inverter forward run
11-15	present fault status, refer to fault records and codes

6.6   CRC16 Function

```
unsigned int crc16   unsigned char *data   unsigned char length
{
    int i   crc_result=0xffff;
    while   length--
    {
        crc_result^=*data++;
        for   i=0;  i<8;  i++
        {
            if   crc_result&0x01
                crc_result=  crc_result>>1   ^0xa001;
            else
                crc_result=crc_result>>1;
        }
```

```
    }
    return    crc_result=      crc_result&0xff  <<8   |   crc_result>>8      ;
    //exchange CRC16 check and high & low byte
}
```

6.7   Modbus Communication Control Examples

Start 1# inverter forward:
Request: 0x01   0x06   0x80 0x000x01 0x00CRCH CRCL
Response: 0x01   0x06   0x80 0x000x01 0x00CRCH CRCL

Notes: 0x8000: virtual terminal low 16
       0x0100: Set the virtual terminal bit8=1   forward command is valid.
       CRCH = A1; CRCL = 9A.
       01 06 80 00 01 00 A1 9A

Start 1# inverter reverse:
Request: 0x01   0x06   0x80 0x000x02 0x00CRCH CRCL
Response: 0x01   0x06   0x80 0x000x02 0x00CRCH CRCL
Notes: 0x0200: Set the virtual terminal bit9=1,reversal command is valid.
CRCH = A1; CRCL = 6A

1# Inverter stopping:
Request: 0x01   0x06   0x80 0x000x00 0x00CRCH CRCL
Response: 0x01   0x06   0x80 0x000x00 0x00CRCH CRCL
Notes: 0x0000: Set the virtual terminal bit8=bit9=0, forward and reversal command is invalid.
       CRCH = A0; CRCL = 0A
       01 06 80 00 00 00 A0 0A

1# Inverter rotating speed is set as50.0Hz
Request: 0x01   0x06   0x00 0x1e0x01 0xf4CRCH CRCL
Response: 0x01   0x06   0x00 0x1e0x01 0xf4CRCH CRCL
Notes: 0x001e: decimal 30, represents P030(First frequency)
       0x01f4: decimal 500, inverter inside unit is 0.1Hz, scilicet 50.0Hz.
       CRCH = E9; CRCL = DB
       38HZ: 01 06 00 1E 01 7C E9 BD

Read 1# inverter output frequency, inverter responds that output frequency is 50.0Hz
Request: 0x01   0x03   0x81 0x020x00 0x010x0d 0xf6
Response: 0x01   0x03   0x020x01 0xf40xb8 0x53
Notes: 0x8102: Output frequency
       0x0001: Read a word
       0x02: Return two bytes
       0x01f4   Decimal 500   inverter inside unit is 0.1Hz   scilicet 50.0Hz

Read 1# inverter status   inverter respondsas forward running   no fault

Request: 0x01   0x03   <u>0x81 0x000x00 0x010xac 0x36</u>

Response: 0x01   0x03   <u>0x020x01 0xa00xb9 0xac</u>

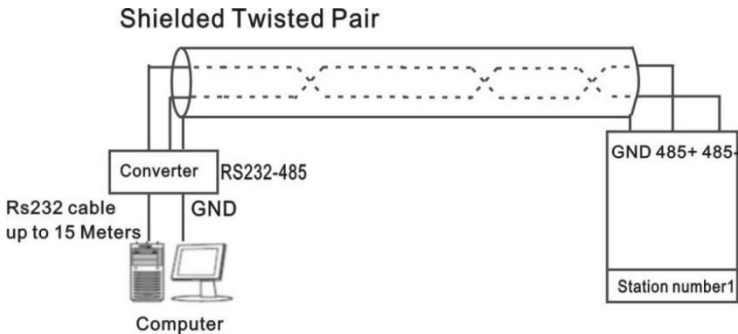Remark: 0x8100: inverter status words

0x0001: read a word

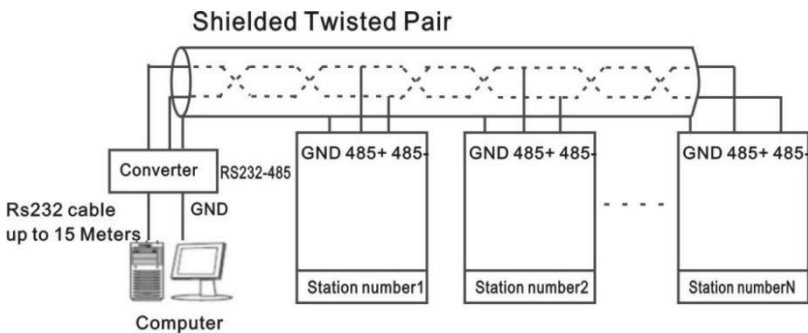0x02: return two bytes

0x01a0: BIT5=1   inverter forward run

6.8 Communication Network Formation

The connection of one inverter to computer

The connection of several inverters connected to computer

Notice：Only the furthest inverter requires to be connected to termination resistor(240 Ω).

CHAPTER 7   QUALITY COMMITMENT

This chapter describes the settlements which our company complies to when handling the quality problems if any. Please read this chapter carefully.

1. Warranty scope: inverter only

2. Warranty commitment: Our company implements three guarantees for product quality.
- Return is guaranteed if quality problem occurs by non-human reasons within 7 days after purchase
- Replace is guaranteed if quality problem occurs by non-human reasons within 30 days after purchase.
- Repair is guaranteed within 12 months after purchase

3. Repair is chargeable even within warranty time if it is caused by following reasons.
- Incorrect operation or repairing & modification by user himself which are not approved
- Using inverter without following the standard regulations.
- Damages caused by throwing or misplacing (e.g. watery place) inverter
- Using inverter in an environment which is not approved according to this manual.
- Inverter damage caused by Incorrect wiring
- Faults caused by force majeure such as earthquake, fire disaster, lightening, abnormal voltage, etc.

Note: All the sales representatives and distributors of our company can provide after-sales service for our products.

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