OPERATING MANUAL

ACF400 SERIES AC POWER SUPPLY

FREQUENCY CONVERTER

Xi'an Jerrystar Instrument Co.,Ltd

Thank you for choosing our products. Please read this manual completely before operating.

Statement for Check and Correction

The unit listed in this manual are completely in conformity with the nominal standards and properties in the ordinary catalog of our company. The products have passed the check in our company before they leave the factory. All checking procedures and steps meet the norms and standards of the electronic inspection center.

Product Warranty

Xi'an Jerrystar Instrument Co.,Ltd guarantees that your new instrument is warranted to be free from defects in workmanship and material for a period of one (1) years from date of shipment. During the warranty period,Please return the instrument to ACSOON Power its branches or distributors for repair.ACSOON Power reserves the right to use its discretion on replacing the faulty parts or replacing the assembly or the whole unit.ACSOON Power will void your warranty under the following states:

- Operation of the instrumentation under non-normal conditions
- Any non-authorized modifications, tampering or physical damage
- Elimination of any connections in the earth grounding system
- Use of non-authorized parts in the repair of this instrument. Parts used must be parts that are recommended by Jerrystar as an acceptable specified part.

This warranty does not cover accessories not of Associated ACSOON manufacture.

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Chapter 1 General Introduction

1.1 Acsoon® ACF400 series is one of the most popular static frequency converter.ACF400 is designed to change the power at 50Hz or 60Hz to aircraft quality power at 400Hz.

It integrates IGBT made by Mitsubishi, Siemens, Infineon, and combines microprocessor and PLC control design together for quicker response and higher reliability.

It is mostly used in aircraft production manufacturing,aviation R&D, civil hangar,maintenance plant, aerospace equipment, exporting electrical appliance factory.

1.2 Theory Of Operation of ACSOON Power

Theory of Operation: Series AF60W, ACF60W ,AF50W ,ACF400 Frequency Converters/AC power source are designed to change conventional 50 Hz or 60 Hz electrical energy to virtually any other frequency. The frequency conversion is accomplished in a two (2)-stage process. The first stage converts the incoming alternating supply voltage to a controlled DC voltage (rectification). The second stage inverts the DC voltage to an alternating supply voltage at the desired output frequency (Inversion).

Chapter 2 Safety Notifications

All safety information given in these Operating Instructions includes a visual icon, a bold signal word and a description.



Signal Word! (Characterizes the severity of the danger)

NOTE (describes the danger and informs on how to proceed)

Icon	Signal Word	Meaning	Consequences if ignored
	**DANGER!**	Warns of hazardous electrical voltage.	Warns of hazardous electrical voltage.
	**WARNING!**	Warns of potential,very hazardous situations.	Risk of severe injury to personnel and/or damage to equipment.

	**WARNING!** **Hot Surface**	Warns of hot surface and risk of burns. Labels may be on or inside the equipment to alert people that surfaces may reach dangerous temperatures.	Risk of severe injury to personnel.
	**STOP!**	Warns of potential damage to material and equipment.	Damage to the controller/drive or its environment.
	**NOTE**	Designates a general, useful note.	None. If observed, then using the controller/drive system is made easier.

Be Careful When Operating The Units

2.1 Safety Instruction

Make sure you know the safety identities used in our product;

Choose the right input voltage before you turn on the input power switch.

Watch out before removal or operating to avoid accidental injury and death.

2.2 Maintenance

User maintenance

Don’t open the cover of the equipment to avoid electric shock;

Maintenance for the internal component of the equipment is not allowed for users;

Please ask our company or other authorized agent for maintenance if there is error

Periodic maintenance

Inspect and check the product as well as the accessories for at least once a year to ensure the safety of the users and the accuracy of the product.

User modification

Users are not allowed to change the circuit and components of the product; otherwise the warranty

will automatically lose effectiveness and our company is not responsible;

No warranty if the components or accessories without permission are used in our product;

The original design of the circuits and components will be restored and maintenance fee will be charged if the product sent back for maintenance is found to be modified.

Chapter 3 Installation

3.1 Unpacking and inspection

1) Open the packaging of the product and check the accessories including an operating manual and a certification.

2)The product is packaged in a box protected by PE foam. If the box is broken, please check the appearance of the product and find out whether there is deformation, scratch or panel damage.

3)Inform us or the authorized agents and keep the packing box as well as the PE foam if the product is damaged. Our service center will repair it or replace it for a new one. Don't return the product to us or the agents without informing.

3.2 Preparation before operation

Requirements and choice of input voltage

The product uses power supply of single phase 120V+/-15%,220V+/-15%/40-70Hz or three phase 380V+/-15%/440V+/-15%/40-70Hz. Please choose the right power supply before turn on the power switch and make sure you use regular fuse (the fuse have been equipped when leaving the factory)

Turn off the power before you replace the fuse in case of danger.

Requirements for input power

WARNING Before switch on the input power, please make sure the earth wire in the power cord has been connected. Meanwhile connect he earth wire to the earth terminal of the machine. The power plugs can only be inserted into the socket with earth wire. Please check there is earth wire in the extension cord if it is used. The product use three-core power cord. The ground connection will be all right when the plug is inserted to a socket with earth wire.

The Surrounding Environment

1)Temperature: 0℃-45℃

2) Relative humidity: 10%-90%

3)Altitude: Below 1800 meters

4)No gas, vapor, chemical deposit, dust, dirt or explosive and etching medium affect the machine

5) No severe turbulence and jolt in the installation site

3.3 Cable Inlet

Attention:for the units which is 2kVA,3KVA,refer to figure 1;for the units which is greater than 3KVA,refer to figure 2

Rear Panel/figure 1

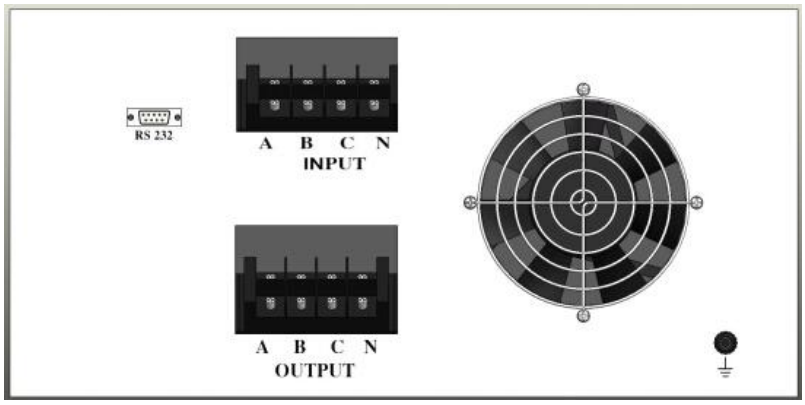
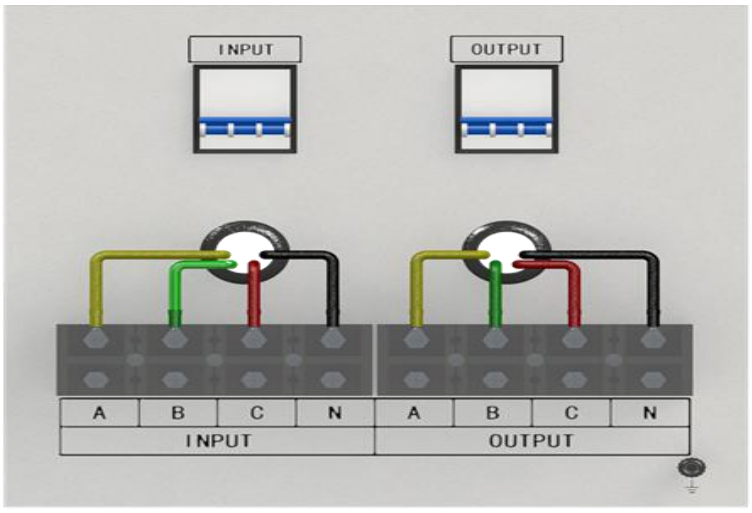


Figure 2



3.4 Cable Selection

3.4.1 Input cables

Model	Input Current（A）	Line Cable（mm²）			Neutral （mm²）	Ground/ PE（mm²）
		L1/A	L2/B	L3/C		

AF400M-110002	11A	6mm²			6mm²	4mm²
AF400M-110003	16A	6mm²			6mm²	4mm²
AF400M-110005	27A	10mm²			10mm²	4mm²
AF400M-110008	43A	16mm²			16mm²	4mm²
AF400M-110010	53A	16mm²			16mm²	4mm²
AF400M-110015	80A	25mm²			25mm²	6mm²
AF400M-110020	107A	35mm²			35mm²	6mm²
AF400M-110030	160A	50mm²			50mm²	6mm²
AF400M-310015	27A	10mm²	10mm²	10mm²	10mm²	4mm²
AF400M-310020	36A	10mm²	10mm²	10mm²	10mm²	4mm²
AF400M-310030	53A	16mm²	16mm²	16mm²	10mm²	6mm²
AF400M-310045	80A	25mm²	25mm²	25mm²	10mm²	6mm²
AF400M-330006	11A	4mm²	4mm²	4mm²	10mm²	4mm²
AF400M-330010	18A	6mm²	6mm²	6mm²	10mm²	4mm²
AF400M-330015	27A	10mm²	10mm²	10mm²	10mm²	4mm²
AF400M-330020	35A	10mm²	10mm²	10mm²	10mm²	4mm²
AF400M-330030	53A	16mm²	16mm²	16mm²	10mm²	6mm²
AF400M-330045	80A	25mm²	25mm²	25mm²	10mm²	6mm²
AF400M-330060	107A	35mm²	35mm²	35mm²	10mm²	6mm²
AF400M-330075	134A	50mm²	50mm²	50mm²	10mm²	6mm²
AF400M-330100	178A	75mm²	75mm²	75mm²	10mm²	6mm²

3.4.2Output Cables

Model	Output Current（A）	Line Cable（mm²）			Neutral（mm²）	Ground/ PE（mm²）
		L1/A	L2/B	L3/C		
AF400M-110002	8.7A	6mm²			6mm²	4mm²
AF400M-110003	12.5A	10mm²			10mm²	4mm²
AF400M-110005	21.8A	16mm²			16mm²	4mm²
AF400M-110008	33.3A	25mm²			25mm²	4mm²

AF400M-110010	41.7A	25mm²			25mm²	4mm²
AF400M-110015	62.5A	35mm²			35mm²	6mm²
AF400M-110020	83.3A	50mm²			50mm²	6mm²
AF400M-110030	125.0A	70mm²			70mm²	6mm²
AF400M-310015	62.5A	35mm²			35mm²	4mm²
AF400M-310020	83.2A	50mm²			50mm²	4mm²
AF400M-310030	125.0A	70mm²			70mm²	6mm²
AF400M-310045	186.5A	70mm²			70mm²	6mm²
AF400M-330006	8.3A	4mm²	4mm²	4mm²	14mm²	4mm²
AF400M-330010	13.9A	6mm²	6mm²	6mm²	6mm²	4mm²
AF400M-330015	20.8A	10mm²	10mm²	10mm²	10mm²	4mm²
AF400M-330020	26.8A	16mm²	16mm²	16mm²	16mm²	4mm²
AF400M-330030	41.7A	25mm²	25mm²	25mm²	25mm²	6mm²
AF400M-330045	62.5A	35mm²	35mm²	35mm²	35mm²	6mm²
AF400M-330060	83.3A	50mm²	50mm²	50mm²	50mm²	6mm²
AF400M-330075	104.2A	70mm²	70mm²	70mm²	70mm²	6mm²
AF400M-330100	138.6A	100mm²	100mm²	100mm²	100mm²	6mm²

3.5 Storage and Transport

Surrounding environment

The product must be stored and transported under following conditions.

Temperature: -20℃~55℃

Altitude: below 1800 meters

Dramatic temperature changes should be avoided to avoid vapor condensed inside the machine.

Packaging

Original packaging

Please keep all original packaging materials in case of future maintenance and repair back to the factory. Contact us in time to confirm the repair. Please send back together accessories (including power cord) with the machine and indicate phenomenon and cause and of the malfunction. Besides, please mark "Fragile" and handle with care.

Other packaging

Package the product according to following requirement if original packaging cannot be found.

1) Package the machine with bubble bag or PE foam properly.

2) Put the machine in multiple cartons which can bear a weight of 150kg.

3) Fill the space between the machine and cartons with thick enough vibration-proof materials at least 70-100mm.

4) Seal off the machine properly.

5) Mark "Fragile" and handle with care.

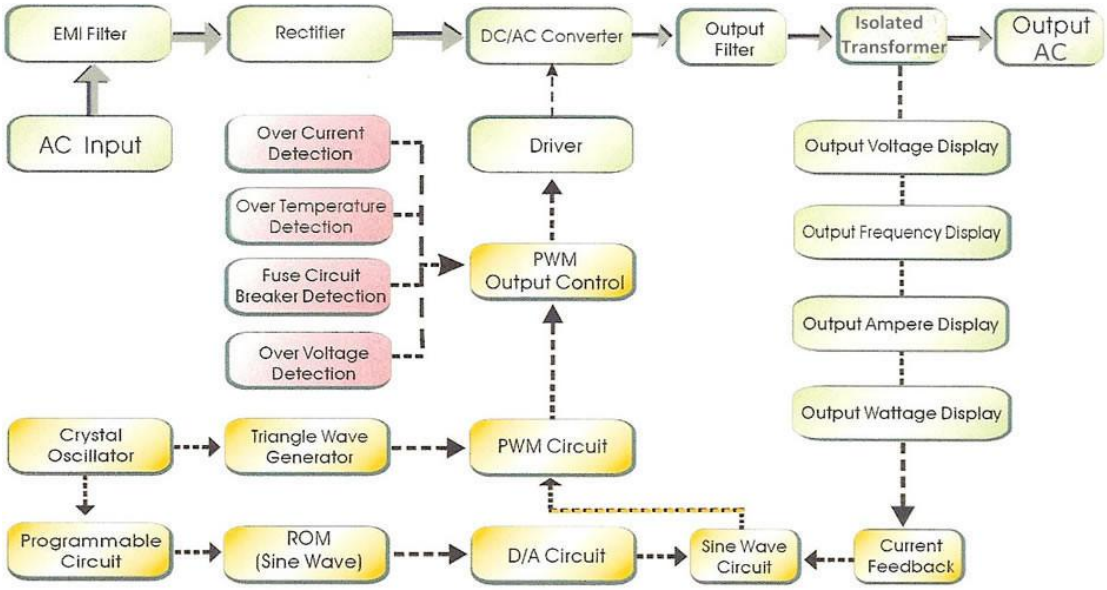
Chapter 4 Standard Technical Parameters

Model	ACF400 – _____P/N:
Circuit Type	IGBT/SPWM
Output Capacity	□ 1KVA □ 2KVA □ 3KVA □ 5KVA □ 8KVA □ 10KVA □ 15KVA □ 20KVA □ 30KVA □ 45KVA □ 50KVA □ 60KVA □ 75KVA □ 90KVA □ 100KVA □ 150KVA □ 200KVA □ 300KVA □ 400KVA □ 500KVA □ 600KVA □ 800KVA □ 1000KVA □ 1500KVA □ 2000KVA □Other
Input Voltage	_____Phase _____Wire_____V±15% □Other
Input Frequency	□ 40HZ～70HZ □Other
Output Voltage	☐ 1 Phase 115V Or 1 Phase 120V ☐ 3 Phase 200V Or 3Phase 380V Or 3Phase 440V ☐ HI/LO range switchable:(HI）0～520V(L-L),(LO) 0～260V(L-L) ☐ Other
Output Frequency	□ Fixed:50HZ □ Fixed:60HZ □ Fixed:100HZ,200Hz □ Fixed:400HZ □ Adjustable:40HZ～70HZ □Other
Load Regulation	□ ≦1% □Other
Freq Regulation	□ ≦0.01% □Other
Wave form	Pure Sine Wave

Distortion THD	□ ≦3%（@ pure resistive loads） □Other
Efficiency	≧85%（@ full load） □Other
Protection	over voltage,over load,over current,over heat ,Short Circuit Protection, Phase loss ,alarm System
Display LED	Voltage : □ 0.1V □other Current : □ 0.01A □ 0.1A □other Frequency : □ 0.1HZ □other Power : □ 0.1W □1W □0.1KW □ 1KW □Other
Cable inlet	□ Terminal block □Other
Working Condition	Environment:-10℃～40℃ Humidity:10%～90%
Altitude	≦1800 meters

Chapter 5 Principle Block Diagram

The principle block diagram of the AF400M Series IGBT pulse width modulation variable frequency power source



Chapter 6 Power Capacity Selection

How to choose correct capacity for the power units(Says power A as below）

6.1 For the resistive load,such as lighting load unit

*for fluorescent lamp,Power A=power of lamp*1.1

*For halogen lamp or sodium lamp,Power A=power of lamp*1.3

6.2 For inductive load,such as motor load unit

When supply for several motors(motor B,C,D,E) and they start running on the same time.

For the motors which are Freq. Start,start running with frequency converter,Power A=2 times for the sum of every single motor,says power A=2(B+C+D+E)

For the motors which are soft start,start running with soft starter,Power A=2.5 times for the sum of every single motor,says power A=2.5(B+C+D+E)

For the motors are Y-△ start,Power A=3 times for the sum of every single motor,says power A=3(B+C+D+E)

For the motors are direct start,Power A=5 times for the sum of every single motor,says power A=5(B+C+D+E)

When supply for several motors(motor B =10kw,C=5kw,D=3kw,E=2kw) and they start running separately,not on the same time.

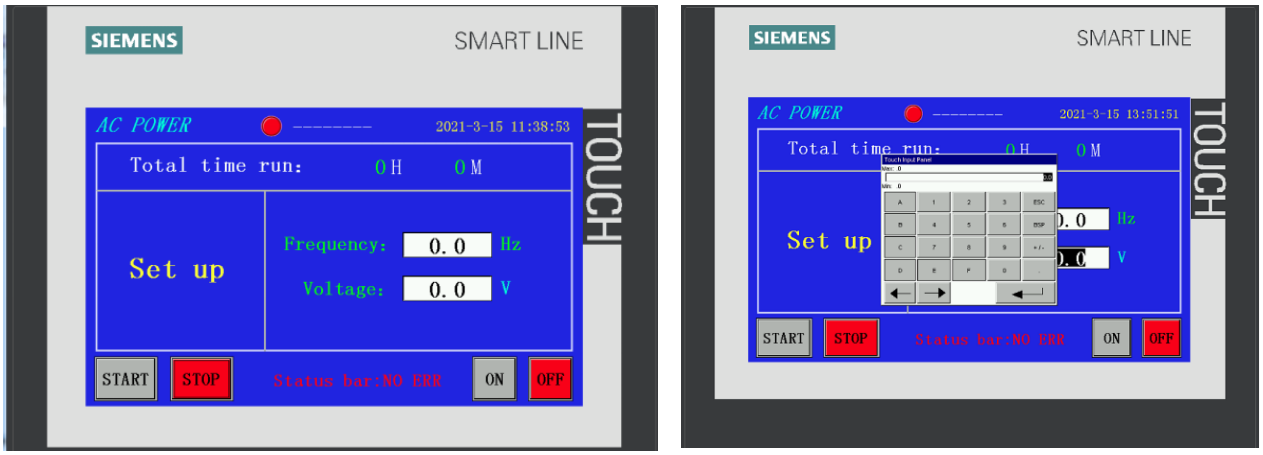
*For the motors which are Freq. Start,Power A=B+C+D+E+B(Max power B)

*For the motors which are soft start,Power A=B+C+D+E+2*B(Max power B)

*For the motors are Y-△ start,Power A=B+C+D+E+3*B(Max power B)

*For the motors are direct start,Power A=B+C+D+E+5*B(Max power B)

Chapter 7 Front Panel Introduction



Front Panel

1. LCD display: Output frequency
2. LCD display: Output voltage
3. LCD display: Output current
4. LCD display: Power
5. Indicator power : kwa (L-N), A,B and C Phase
6. Indicator Voltage: Vac (L-N), A,B and C Phase
7. Indicator Current: I a,Ib and Ic, A,B and C Phase
8. Voltage set & Frequency set
9. Info indication of over-current, over-voltage, short circuit, wrong phase squence etc.
10. Date and time indicator
11. Start / Reset indicator button
12. Frequency & Voltage Potentiometer knobs for frequency and voltage value adjust
13. Emergency Button installed below the LCD displaying panel

Chapter 8 Operation

Step 1:Please check the input alternating current, make sure the safety before the converter energized

Step 2: Get the input and output hard cables connected among the mains electricity, converter and loads

① Trigger the input circuit breaker, LCD display is in standby mode.

② Press the “Start”, the unit starts working and starts outputting, and indicating light is on. LCD panel shows output voltage, output current, output frequency, power of loading. Current meter shows 0.0 with no loads. The converter's LCD displaying Power kW shows 0.0 when small loads connected, and in this case the voltage and current value would be very small.

③ Set the Frequency and Voltage value through the LCD touch screen. Frequency & Voltage coule be set and adjusted by Potentiometer knobs, where installed on front door panel

Start & Stop

① Press “Start” to run if the voltage and frequency well setted. Turn off the circuit breaker off if you wanna stop the output power.

② During working, if it has failure, the internal protection circuit will automatically shut down and stop outputting, and the error info indicated on LCD displaying panel

Chapter 9 The routine maintenance and troubles shooting

Note:Only electrician is allowed to maintain this unit. Please note the inner high-voltage electricity, lay persons are not allowed to open the unit’s door and maintain the unit. When the unit can not work, please turn off the unit and then check it as these steps blow.

Please be aware that the DC Capacitors can remain charged to a dangerous voltage up to 10 minutes after the mains input has been disconnected.

9.1 Introduction of every parts inside the unit

Part A:AC/DC module(Rectifier)

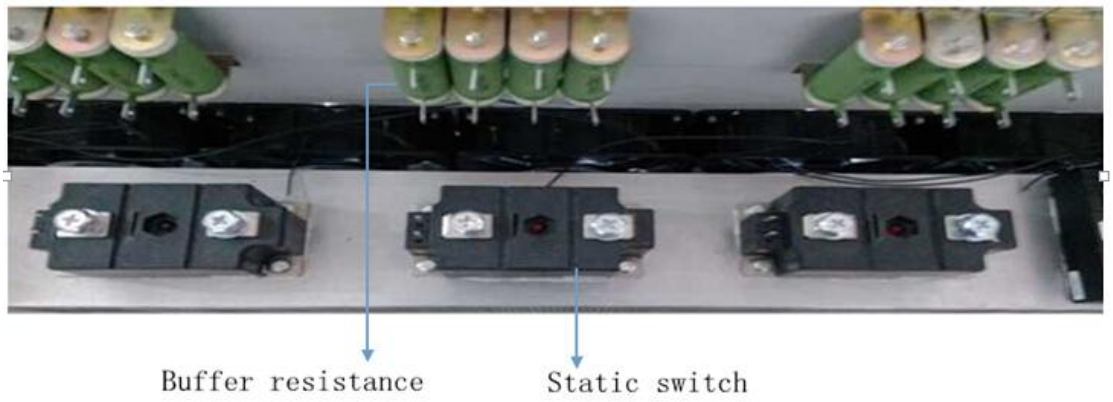
A rectifier is an electrical device that converts alternating current (AC) which periodically reverses direction to direct current (DC)which flows in only one direction





Part B: Buffering Circuit module

When to give power to the unit, the electrolytic capacitors need to be charged, the charging current is very large and cause the damage of the front-end rectifier modules or make input breaker trip; Buffering Circuit can make capacitors charge slowly and the current goes up slowly.



Part C:DC/AC module（IGBT）

IGBT(Insulated Gate Bipolar Transistor)
Which inverts Direct Current(DC) to alternating current(AC)



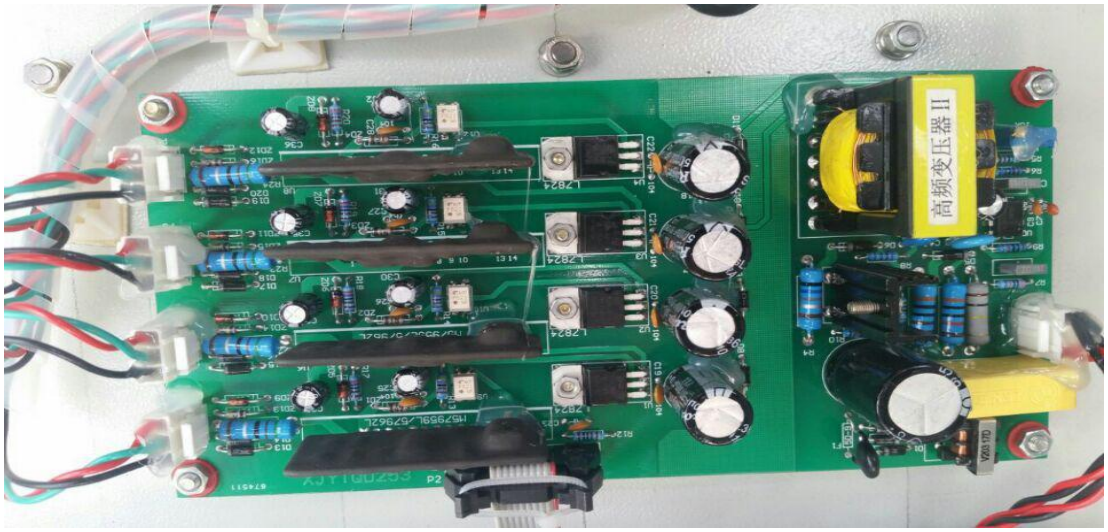


Part D:Driven Circuit Board(DCB)

- ✧ To drive the IGBT module "on" or "off"
- ✧ When press the button of "stop", it means when the unit is stop running,the voltage between these two terminal(red wire-green wire) is around DC8V,when press the "start", it's about DC

-3.0V,there are 4 group “red wire-green wire” here.if any group of voltage you got is big different with these two value,it tells the DCB is faulty. (testing point:red wire-green wire,4 group need to be tested)

✧ It's 10K Ω when the IGBT is fine,if it's much less than 10K Ω ,it tells the IGBT is faulty(testing point:red wire-green wire,4 group testing point here)



Part E:Power off/on Board

This board is giving the DC power to drive the Mother board(Control Board）



✧ Testing point:black wire-yellow wire,black wire is in the middle,black-yellow(right side) is +17VDC,black-yellow(left side) is -17VDC.

✧ Testing point:black wire-green wire,black wire is in the middle,black-green(right side) is +12VDC,black-green(left side) is -12VDC.

✧ If the Voltage you got is big different with these two value,it tells this Power off/on is faulty.

Part F:Output Filtering Capacitor

Filtering capacitor in parallel with the isolated transformer can make the output power so clean,it's 6 μF,30 μF,100 μF etc,it has different size for different units.



9.2 Fault Indication &Solution

9.2.1 The buzzer alarm and the LED marked"GL/LED3" is lighting up in the motherboard,it means over current alarm.

- ✧ If have no load units,the IGBT module and the Driven Circuit Board may be faulty,please check them as per instruction showing in Part D
- ✧ If have load units,please cut off some loads.

9.2.2 The buzzer alarm and the LED which marked"GR/LED1" is lighting up in the motherboard,it means over heat alarm.

Please check the exhaust fans,they may not work or its speed becomes slow.replace new ones or reduce some load units.

9.2.3 The buzzer alarm and the LED which marked"GY/LED2" is lighting up in the motherboard,it means over voltage alarm.

Please check the output Filtering Capacitors showed in Part F,test it to see how many μF it is,if it's about 0.3 μF (almost zero)when it should be 30 μF,50 μF... which is showed in the label.it tells they are faulty,please replace the new ones.

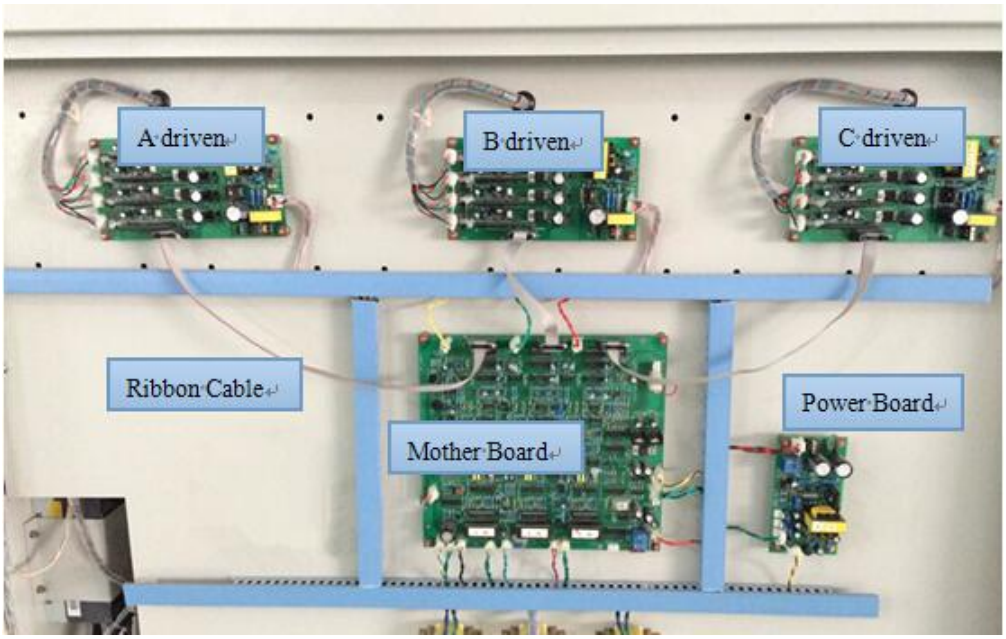
Note,please disconnect the capacitors from the unit before test it with meter.

9.2.4 The display shows output voltage is much lower than the setting voltage Please check the buffering circuit modules. If you can feel the heating come from the buffer resistance obviously or the resistance looks been burn it can tell the static switch is faulty.

9.2.5 If the panel display is not lighting up after press the “start” button, please check the "Power off/on Board"showed in Part E,please test to see if it's +-DC17V or +- DC12V shown on the part E,if not,it tells this board is faulty.

9.2.6 How to know the mother board is faulty or not.

For the 3 phase unit, each phase is independent.the motherboard connected each phase driven circuit board with a single gray flat-cables,so there are 3 gray flat cables here **Action**:turn off the unit first ,then Please disconnect the 3 gray flat-cables from the mother board,now turn on the converter to see if the alarm is still there,if yes,it means the mother board is failed.If No,it means the mother board is good.



Chapter 10 Precautions for Use

(1) The product must work in the specified environment, and please pay attention to the installation condition for the full play of its function as well as its service life:

Avoid rain, moisture, high temperature, high heat and direct sunlight; the cooling vent should be at least 40cm far away from the wall.

Don’t use the machine in the place where there are corrosive liquid or gas, dust, conductive fiber and metal filing.

Keep the machine away from vibration and electromagnetic interference.

Avoid long-term inverted store or transport and strong impact.

(2) Pay attention to the follow situation while using the machine

Please strictly distinguish the null wire and the live wire of the output terminal and ensure good machine grounding before use.

Turn off the power supply is prohibited while the machine is running

Don’t touch the electric parts of the machine to prevent electric shock while the machine is running

Non-professionals is prohibited to open the enclosure.

Chapter 11: Contact Detail

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