# EA660 Modular UPS User's Manual



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## PREFACE

Thank you for choosingEA660 modular UPS system.



The manual covers UPS installation, use and operation instruction, ect.. Do read carefully the manual before the system installation, and strictly comply with all the warning and instruction in the manual and on the UPS unit, and keep the manual safe.



Earthing is requried before UPS using.

EA660 is hot-swappable and can be inserted in or out online without shutdown. But at least 10min's waitting is required for the inner repair due to high voltage on the needle of module rear terminals when insert or pull out of the module, mornitor, and static switch.

Battery replacement must be done by qualified maintenance people. And the nocuous battery scrap discarded must be sorted and recycled.



With CE and TLC certificate



EA660 vendition is only limited to those who have general idea about the product. To avoid any accident, understanding its requirement of installation or operation is also necessary.

# **1 STORAGE**

Please check the packing first. If there is no damage and no installation for a long time, plz keep the UPS standed and steady in the temperature and humidity condition as below,

Storage temperature:  $-25 \sim 60$ 

Relative humidity: 5% ~ 95%

10  $\sim$  30 is most suitable for storage.

## **2 INSTALLATION ENVIRONMENT**

- ♦ Place it steadily ;
- $\diamond$  Leave enough ventilation distance between each side of UPS body and the wall ;
- ♦ Far away from hot source and any corrosive things; Avoid straight sunshine ;
- ♦ Keep normal working temperature and altitude ;

Working temperature :  $-5 \sim 40$ 

Altitude : = 1500m

- ☆ Keep clean working environment; keep away from humidity, flammable gas, flammable liguid, or corrosive things.
- $\diamond$  Consider the floor's bearing ability against the machine and battery group.

# **3 UNPACKING & PLACEMENT**

## 3.1 Check packing

Pls check packing first, make sure there is no damage, and then open the packing and check the machine.

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3.1.1 Systems Packing Open the wooden box first.

The way to open is as following sketches, Place wooden box standed



Note : When place the wooden box standed, make legs which support the wooden box downwards, otherwise it will bring inconvenience to unpack the box and place the system..

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Open the front panel of the wooden box, and take out of the bubble.

Note: Pull out nails with tool, and prize up the front panel of the wooden box with scratching care.

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Separately take apart the top board and side board of the wooden box, then take out of the bubble.



After unpacking, check accessories such as the user's manual, CD and keys of front door, side door and back door ect.

## 3.1.2 Module/ static switch/monitoring packing :

Open wooden box first. The way to open is as following sketch:Place wooden box steadily;



Note: Place the wooden box according to the directions pointed by the box lable.

Open the wooden box cover ;



Take out of the module from the wooden box.



At last cut off the plastic strip, and the transparent tape, open the carton box and then take out of the bubble and the moudle.

Note : Safe keeping accessories is required, expecially the users' manual and CD, which include many important safety instructions. Do not operate the uint until compeletely read all information about the safety instructions. Strictly comply with all warning and instructions in the manual and on the unit.

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After unpacking, please deal with the waste according to the requirement of green environment protection.

## **3.2 PLACEMENT**

To make sure UPS steady, drive the expanded bolts into the ground when placing the unit. And then fasten the expande bolts after it's placed steady. ( The unit body is 740mm (not including front and readr door), 800mm ( including front and readr door) ). Refer to the following drawings :



Make sure safely use the UPS. The placement position should be proper. Not only keep clean working environment, but also keep away from humidity, flammable gas, flammable liquid or corrosive substance environment, and avoid straight sunshine ; Meanwhile note to keep space

 $\square$ 

distance between UPS and all arround for ventilation and cooling. The minimum space distance is as below drawing indicated ( mm ):



Note: The unit body can be paralled, so there is no requirement for the side distance. Don't stuff or insert anything into the intake and other hatches to make sure well aeration.

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# **4** System introduction

System main parts include UPS system cabint, Power modular, System monitor and Stastic

switch., the structure as following picture.



System cabint top view





# **5** Installation and connection

## 5.1 Installation

Normally, first install the static switch, and then monitor system; just insert the equipment(static switch and monitor system) to the right placeand then fix the equipment with screws on the cabinet; and the last step is to install the modulars.

Note: please make sure the terminals are inserted completely and properly when installing the systems; and don't insert too hard to avoid damage the pins of the terminals.

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## 5.2 Input and output terminals

Input and output terminals :



Neutral and ground terminal:



## 5.3 Power ,load and battery connection



Note : the battery must be connected with circuit breaker or fuse so as to ensure the safety of the system.

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# 5.4 Choice Table of Parameters setting

Parameters	setting	choice
1 41411100015	Second	•110100

System name		EA66-060	EA66-100	EA66-150	EA66-200
U	IPS capacity	60KVA	100KVA	150KVA	200KVA
	Voltage V		38	80	
	Rated current A	95	160	230	300
AC INPUT	cable mm <sup>2</sup>	35	50	70	70
	bolt mm	M6		M8	
	Circuit breaker A	125	160	250	300
	voltage V		380	/220	
DVDACC	Rated current A	75	125	185	265
BYPASS INPLIT	cable mm <sup>2</sup>	35	50	70	70
1401	bolt mm	M6		M8	
	Circuit breaker A	125	160	250	300
	voltage V		38	80	
	Rated current A	75	125	185	265
OUT PUT	cable mm <sup>2</sup>	35	50	70	70
	bolt mm	M6		M8	
	Circuit breaker A	125	160	250	300
	Battery capacity AH	65	100	150	200
BATTERY	cable mm <sup>2</sup>	35	50	70	70
DATIERI	bolt mm	M6		M8	
	Circuit breaker A	125	160	200	250
N	cable mm <sup>2</sup>	35	50	70	70
1	bolt mm	M6		M8	
ÞF	cable mm <sup>2</sup>	35	50	70	70
	bolt mm	M6		M8	

## 5.5 Remote control and signal interface

The system provides several kinds of interface and dry contact signal; the below chart is for EA660 UPS system signal interface port reference:



1、 A is no-source output dry contact, two pins as one pair(see the picture above)。 no-source dry contacts controled by relay; each pair of the dry contact connection is shown below (AC type and DC type) :



#### Alarm correspondance see below :

Mark	Mode	Dry contact pair connection	Two ends of the dry contact disconnected
LOADINV	Inverter output	System in inverter output mode	System in non-inverter output mode
LOADBYP	Bypass output	System in bypass output mode	System in non-bypass output mode
INVFAIL	Inverter failure	System inverter votage abnormal	System inverter votage normal
BYPFAIL	Bypass Failure	System bypass input voltage abnormal	System bypass input voltage normal

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Mark	Mode	Dry contact pair connection	Two ends of the dry contact disconnected
ACFAIL	AC input failure	System AC input voltage abnormal	System AC input voltage normal
DCFAIL	DC failure	System DC input voltage abnormal	System DC input voltage normal
OVLOAD	Output overload	System output overload	System output normal
ALARMS	Alarm	inverter, bypass, DC & AC alarms	Inverter, bypass, DC & AC normal
STANDBY1	Standby 1	NO	NO
STANDBY2	Standby 2	NO	NO

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2、 In the picture, B is source dry contact, two pins as one pair(see picture); if both are disconnected, it is normal signal; if both get short-circuit, it is alarm signal; the connection of each pair of dry contact is shown below:



3, C is communication port( only one port can be used; the three ports can't be used at the same time )

The communication port baud rate is 9600; the data bit is 8 bits

C-1 is RS485/RS422 port; when the baud rate is 9600, the max. communication distancess 500m; when you set RS485 as monitor port, you only need to connect pin A and B(please see the 7<sup>th</sup> operation "2. setting); when you set RS422 port, you have to use all the pins of this port; the connection is shown below:



Note: from left to right in sequence "A—B—Y—Z"; you need to use twisted pair with corresponding pins.

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C-2 is RS232 port, when the baud rate is 9600, the max communication distance is 50m; pin 2,3 and 5 are used to correspond system "receive" "send" and "ground" respectively. The RS232 connection cable can be connected to the computer shown as below:



C-3 is LAN port. The setting of LAN communication port is shown below:

Please connect the computer on internet ; you may use twisted pair lan cable connecting the computer or use direct twisted pair lan cable connecting computer through switch.

Set the computer IP as "192.168.16.XXX"; please make sure the IP is not conflicted and in the same LAN, the gateway and subnet mask are correct or not.

Use Ping to check if the connection of the system is normal or not; the default address of the system is "192.168.16.254".

Input "192.168.16.254" in the IE; open the internet setting interface as shown below:

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「2」 http://192.108.4.200/ - Licrosoft Internet Explorer	
	K 🖪 🅸
地址 @) 🛃 http://192.1停止 200/	✓ → 转到 链接 ※
Coogle C → 控索 🗤 🐼 资讯 🍒 按钮集 👻 🐼 书签 → 🐼 已拦	截 12 个 》 💮 设置▼
	~
欢迎使用MWT100系列产品!	
用户名: Admin	
密码: ••••••	
提交重置	
< /b+m]	
	~
② 完毕     日本     日本	🥥 Internet

Open the log-in interface; the users' name is Admin and the password is Admin888; click submission to enter the next page.

Note : please make sure the users ' name and password are correct and it makes difference when you capitalize the letters.

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Open the overall interface, click "check the equipment" and you can check the parameters of internet and serial interface; when you click "parameters setting", the interface will be turned to the below:

◎ 配置向导 - Microsoft Internet Explorer	
文件 (E) 编辑 (E) 查看 (V) 收藏 (A) 工具 (I) 帮助 (H)	
🔇 后退 🔹 🕥 - 💌 🛃 🏠 🔎 搜索 🌟 收藏夹 🤣 😥 - 嫨 🗹 - 📃 🌾 🔣 🦓	
地址 @) 截 http://192.168.4.200/setting.htm	✓ → 转到 链接 ※
Google 💽 - · · · · · · · · · · · · · · · · · ·	◎ 设置▼
以太网通讯参数配置	~
本机P地址: 192.168.16.254 子网掩码: 255.255.00 网关地址: 192.168.16.1 本地端口: 6000	
串口通讯参数配置	
申□1: 波特率: 校验位: 数据位: 停止位: 1	
提交 ■	>

You may set ethernet communication parameters and serial interface communication parameters as shown below:

ethernet communication parameters setting

"the computer IP address" means MWT IP;

"subnet mask" means the subnet mask of MWTin the LAN;

"gateway address" : if no gateway, please input 0.0.0.0;

"local port": if you want the equipment to work in server mode, you must set local port so that the client can connect with the local equipment through the port; the default port No. is 6000. if the equipment is set as a client, please ignore this item.

"working mode": you can choose SERVER or CLIENT; you can set MWT as server or client; the default is server mode.

"TCP/UDP choice" : you can set the communication agreement through it; there are two choices TCP and UDP; the default mode is TCP.

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"remote control port": if you want the equipment to work as client, you must set a remote control port so that the equipment can connect the romote server through the port; the default port No. is 6000. if the equipment is set to be server, then you don't need to take this item into consideration.

"Remote IP address" : The address for remote server-side IP address, If the device is working in client mode, it must be for the device configuration remote IP address, so that the device access to the remote server through the address. Factory default address: 192.168.16.252. If the device is configured for the server, the option can be ignored

#### Series communication parameters configuration

"Baud rate" : series communcation baud rate used by the baud rate, there are several 2400,

4800, 9600, 19200, 38400, 56000, 115200 to choosen. The factory default setting for 960

"Parity bit": could be choosen, NONE, ODD, EVEN. The factory default setting for NONE

"Data bit": This option is that the median data communications, MWT serial server, respectively,

in support of 8,7,6-bit data communication. The factory default setting for 8

"Stop bit": can choose 1 or 2. The factory default setting for 1

When after all the parameters to configure, click the "submit" button, if the configure success, it must be return to website "DONE, please reload the page with new IP address!". And equipment will be automatically reset, loading the new configuration parameters. At this time equipment has been based on user-configured to work corresponding running.

Note: PC software has been introduced and explsining in the system, if necessary please refer to the contents of the system disk.

# **6** Systems panel instruction

## 6.1 Static switch

EA66 modular UPS, the static switch module is mainly used inverter output and the exchange of AC bypass power quickly to a comprehensive system to improve the security of electricity supply and reliability.

Static swtich module to receive two sets of AC input, select a group of output. on-line work, the static swtich inverter output power module connected to the system output on. If the power module can not provide sufficient voltage at a specified period, by detecting the time, the static switch will stwich to bypass power immediately.

Static switch panel diagram as following:



Static switch on the light display from left to right, introducing the meaning from up to down:

- "Bypass"status indicators for the bypass. Bypass normal, green LED on; no bypass or bypass abnormal, red LED on;
- "Inverter" for inverter status indicators. Inverter normal, green LED on; no inverter or inverter abnormal, red LED on;
- "Output" for output status indicators. Inverter output, green LED on; The others, red LED on;
- "Sync" for the synchronization status indicator, the inverter and bypass in the same phase and frequency, LED on;
- "Run" UPS work indicator.
- "Reset"to reset the status indicator.

## 6.2 Monitoring

Monitor is located at the top of the cabinet's side, through the display, operation panel, it is easily to understand the system status, query parameters and various event information. After installation, Users of the system can be adopted by all operators monitor the completion of the operation panel.

onitor is divided into three area: status indicator area, data display area, button operation area. LED status indicator light district through the different states tp provide users with a simple sysytem state information. LCD data display district through its display screen to provide the detail system state information; through nine buttons of key operating area, the user's command with system connected to, when the user handle the button, LCD display screen shows all the corresponding information.

monitoring panel diagram as following:

SYSTEM CONTROLLER -R- 000V 000V 000V SYSTEM 4 -S- 000V 000V 000V STSW F -T- 000V 000V 000V UPS 00 BATT 410V 410V FL 14:02:03		Inverter	Bypass	Alarm D Silence
С	В		А	

- A district for the district status indicator:
  - "Driverter", "status indicator for the inverter, inverter normal, the lights;
  - "\_\_\_\_\_"status indicator for the bypass, when system is in bypass mode power supply, the lights;
    - Alam
  - "\_\_\_\_\_'for failure alarm light, when the system a variety of failure, the fault alarm

lights.

• B district button operation area:

• System monitoring panle a total of nine buttons, of which six navigation keys and three special function keys, these six navigation keys, respectively:



- 4
- " **•** "-----LEFT
- " **?**"-----RIGHT
- " Ent "\_\_\_\_\_ENTER
- " Esc "\_\_\_\_\_Esc

Special function Keys:



- "Ch/Float"----- Average charge and float charge conversion
- "<u>Silence</u>"-----MUFFLER

NOTE: Special function keys need push until 5 seconds; System without Bypass, cannot shut down; System without AC input, can't change to average charge mode

- C for data display district:
  - Display introduction see "nine、 monitoring dispaly"

## 6.3 System modular

Module panel showing as following :



- Run: the light continued to flicker when modules start-up, start finished, the light bright long time; modules do not work, the light out.
- Battery : When modules working in the state of the DC power supply, the lights; when the module is local in the non-DC power supply, the light out.
- Alarm : When module abnormal(AC input abnormal, inverter output abnormal, overload, DC abnormal, Fans anomalies) the warning light; when module systems is running normal. the light out.
- ON/OFF : Single module swtich buttons.module boot, when the module is turned off, the button long 5seconds, then the module self-normal boot; module shutdown, when the module is stitched on, long after the button 5seconds, modules shutdown.

# 7 System start-up & setup

## 7.1 Start-up program

EA66 Series UPS start-up, shut down, maintain bypass operation, as well as the various of stages of device status information as following:

Remark: Before to the implementation of the followng action, please must be read the user manual carefully in order to avoid misoperation causing harm and damage to equipment.

7.1.1 System operate without the power state

(1) Check all screws whether fasten, the cables whether connect well. All input, output, battery empty switch should be shut down status.

(2) The manual bypass switch is located in the back of system open to the bypass output state.Status diagram:



NOTE: the above operation in order to prevent an impact on the load to ensure the safe use of electricity users.

## 7.1.2 Switch on the battery input switch

At this time, system monitoring start work, the overall message from the system monitor screen can be seen DC voltage.

State Diagram:



Static swtich panel Load on Bypass ( bypass output ) light、 Alarm ( bypass alam ) light、 Sync
( synchronization ) light、 Run ( running ) light flicker、 Alarm ( inverter alarm ) light;
 State Diagram:



Note: Static switch normal working,run(running), the light continue flicking

Run light flicker, warning light keep on lighting, it means the module is in the start state.

State Diagram:



10seconds later, the system monitor ALM lighting and keep on buzzing for alarm





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EVENTS       Inverter       Bypass       Alarm         07 - 25       13:56       UPS T OWE VOLT       Inverter       Bypass       Alarm         07 - 25       13:56       UPS S OWE VOLT       Imverter       Bypass       Alarm         07 - 25       13:56       UPS R OWE VOLT       Imverter       Bypass       Alarm         07 - 25       13:56       UPS R OWE VOLT       Imverter       Bypass       Alarm         07 - 25       13:56       UPS R OWE VOLT       Imverter       Bypass       Alarm         07 - 25       13:56       UPS R OWE VOLT       Imverter       Bypass       Imverter         NAVI       Imverter       Imverter       Bypass       Imverter       Bypass       Alarm			
07 - 25 13:56       UPS T OWE VOLT         07 - 25 13:56       UPS S OWE VOLT         07 - 25 13:56       UPS R OWE VOLT         07 - 25 13:56       BYP T OWE VOLT         NAVI 公式       14:04:21		Inverter Bypass Alarm	
07 - 25       13:56       UPS       S       OWE       VOLT         07 - 25       13:56       UPS       R       OWE       VOLT         07 - 25       13:56       BYP       T       OWE       VOLT         NAVI       公子       -       14:04:21       -	07 - 25 13:56 UPS I OWE VOLT		
07 - 25     13:56     UPS     R     OWE     VOLT       07 - 25     13:56     BYP     T     OWE     VOLT       NAVI     C     -     -     14:04:21     -	07-25 13:56 UPS S OWE VOLT		
07-25 13:56 BYP T OWE VOLT III III ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	07 - 25 13:56 UPS R OWE VOLT		
NAVI 企巧 14:04:21   🗖	07-25 13:56 BYP T OWE VOLT		
	NAVI 127 14:04:21		
On/Off Ch/Float Silence		On/Off Ch/Float Silence	

Note: Inverter three-phase output undervoltage alarm, the reason is that the inverter power module without output, the system is in working condition bypass.

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About 1minute later, all Run light Keep on lighting on the modules panel, DC supply power indicator light keep on lighting, warning light keep on lighting, because the system without the city of electric input.

State Diagram:



At this point, monitoring indicator and static switch indicator state no change.

At this point, no output, because the system is in manual bypass states.

## 7.1.3 Switch on the AC Mains switch

System monitor to show the current AC voltage.

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State Diagram:
```



About 60seconds later, the DC module panel indicator light out; because at this time for the AC supply.State Diagram:



At this point, monitoring indicator and static switch indicator state no change.

At this point, no output, because the system is in manual bypass states.

7.1.4 Manual bypass will be transferred to the inverter output state. State Diagram:



Automatic synchronization, the static switch panel READY light.

State Diagram:



After 20s, system will change to inverter mode, the AC contactor of inverter will pull-in automatically.

State Diagram:



Note:System output from inverte; inverter bypass in-phase is normal; the phase-sequence

The alarm Led on the monitoring panel of system will be off. Buzzer stop alarm automatically; the display of inverter showing as below.

SYSTEM CON	ITROLLER	Inverte	r Bypass Alam
- R - 229V 000/	A SYSTEM ON A STSW OK	Esc 🗖	
-T- 221V 0004	UPS 00/1		
BATT 417V 417	/		

State Diagram:



## 7.1.5 Switch on input switch of Bypass.

Display showing the bypass voltage.



The Alarm light ( bypass alarm) on Satis Switch will be off because the current output is from bypass.

State Diagram:



Note: During the proceeding, system maybe alarm "OUT PHASE' (fault on bypass phase-sequence). If system indicate "OUT PHASE' and wont indicate "PHASE OK"(bypass phase-sequence get right) later, the connection of bypass input must be wrong, please check the phase-sequence and change them to right, then the problem will be solved.

## 7.1.6 Checking Phase sequence

When the system have output, we need to check if the phase-sequence between the output terminal and bypass input terminal. The method is using multimeter. Please put probes on bypass input terminal and system output terminal when the multimeter is at AC voltage position. Respectively test phase-R to phase R, phase S to phase S, Phase T to phase T, if the differential voltage is above 300V, that means the phase-sequence is wrong. Please cut off all of the power (firstly, cut off bypass input air switch, then cut off AC input air switch, lastly cut off the battery input air switch). Then change the input phase to right sequence.

7.1.7 If set manual bypass in bypass output mode. System will change from inverter output to bypass output.



If set manual bypass in inverter output mode, system will change from bypass output to inverter output.

State Diagram:



Remark, above operation are trying to avoid any negative affection to load, to make sure of electric safety.

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7.1.8 Switch off the output switch.

Start-up operation is done.

7.2 Set-up

You can set the system parameter on the system monitoring panel.

If the screen is at "SYSTEM CONTROLLER" display (Please refer to 9.1), Press key-press

"ENT" to enter details information screen.

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#### State Diagram:



There have three setup items:

"DATE TIME"-----System time

"BATTERY"-----battery management parameter

"OTHERS"------ System ID, display contrast, communicateion port and

Maximum modules

Select "1 > DATE-TIME", press "ENT" key-press to enter time setup screen. Press "ENT" again, the numerical value after YEAR will be at flash mode, you can use left key and right key to select other item, and use up and down key to change the numerical value.

DATE - IME			Inverter	Bypass	Alam
IVIQIN U7 MINI 37		Esc			
WIIN . Zł	360.22				
		Ent			
`	15:28:25				
			On/Off	Ch/Float	Silena

	1 ctu
"MON"	Month
"DAY"	Day
"HOUR"	Hour
"MIN"	Minute
"SEC"	Second

2、Select "2 > BATTERY" from the setup menu screen, press "ENT"key-press to enter battery setup screen. Press "ENT"again, the numerical value after "FLT/CHG VOLT" will be changed to flash mode, you can use left key and right key to select other item, and use up and down key to change the numerical value.

BATTER	Y	•		5	
FLT/CHG VOLT:	425V / 435V		Inverter	Bypass	Alam
T - COMPENSATE :	50 mV / C	Esc			
LIMITED CURR :	060A * H		_		
SWITCH CURR :	00020A				
-	- 15:28:55				

FLT / CHG VOLT"------set up value of floating charge and equal

charge

Normally, floating carge voltage is 425V, and equal charge voltage is 435V;

"T-COMPENSATE"-------set up the charging temperature compensate

Normally it is 50mV/C;

" LIMITED CURR"------Setup the capacity of battery

Setup according to the connected battery;

"SWITCH CURR"------Setup the current value when switch

between floating charge and equal charge.

Normally it should be 5% of the battery capacity value.

3、Select "3 > OTHERS" from the setup menu screen, then press "ENT"key-press to enter the setup screen of other items. Press "ENT"again, the numerical value after "SYSTEM-ID" will be changed to flash mode, you can use left key and right key to select other item, and use up and down key to change the numerical value.



## 8 Switch off System

1、 Switch off output switch

All load will lose the power.

2、 Press ON/OFF button on system monitoring panel continuously for more than 1 second

At this time, the bypass voltage is normal, the inverter contactor is cut off, bypass contactor is pull-in, the system is changed to bypass output; Turn off all of the modules, the alarm LED on each module light continuously.

States diagram :



The alarm LED on monitoring panel light continuously, buzzer buzzing continuously, the system monitoring LCD indicate information:

States diagram :

	EVENTS 07-25 14:48 UPS OFF 07-25 14:48 RLV LORD BYP 07-25 14:46 UPS ON LINE 07-25 14:45 SYNC OK			Bypass	Alarm
	NAVA 125 14:49:43		On/Off	Ch/Float	Silence
Ģ	Note: System shut down; R is lack of voltage and system of	changes to bypass;			

#### EA660 Modular UPS



Note:System alarm, inverter output in low voltage, the reason is system have no output.

Note: To protect the load, if the bypass voltage is abnorma, System wont be abletoshut off, and it will indicate infomation:: "BYP ERR CMD C " (Bypass Erro, shutdown command cancelled)

ค

At this time, Inverter indicator of Static switch go off.

State diagram :



Sytem is at bypass mode, output from bypass input voltage.

3、 Cut off bypass input air switch.

System monitoring display the bypass voltage is zero, and indicate infomation:

State diagram :



At this time, Bypass indicator of static switch go off.

#### State diagram



At this time, system have no output because there is no bypass input power.

4、 Cut off AC input air switch.

System monitoring display indicate the AC input voltage is Zero, System output from DC power, and indicate information.

State diagram



Note: Ac input owe voltage because there is no AC input power.

Here, the indicator of static switch have no change.

State diagram :



All module alarm LED light up.

5、 Cut off battery input air switch

System monitoring display indicate the AC input voltage is Zero, and indicate information.

State diagram:



After 5s, system shall totally lose power. Shut down opreation is done.

## 9 Monitoring display

Display interface divided by two parts: overall information screen and details information screen. If the current display is overall screen, press ENT key-press to enter details info. Screen; if user don't operate for a while, the display will come back to overall screen automatically.

#### 1. Screen to display overall information

State diagram



Area A : Display the running ouput voltage and current.of 3phase (If system is at inverter mode, then it displays the inverter output voltage, current ; if byass mode, then it displays bypass's.)

Area B : Display the running DC voltage ( If system works battery mode, it displaysbattery voltage; If batterybeing charged, then it displays recharging voltage. ) .

Area C : Display the whole system status :

- "SYSTEM" means current system ON/OFFstatus。 "ON" means working status ; "OFF" means switched off status.
- "STSW" means the status of static switch, "OK" means all ready, it can transfer at any moment; "FAIL" means problem, and can't transfer,
- "UPS" means the online's modular's quantity. Before"/" means online module's quantity;After "/" means max allowable modules.
- "FLOAT" or "CHARGE" means battery recharging status "FLAOT" means float charging ; "CHARGE"

means constant charging.

2.Details information screen

Please refer below :



The chart above displays choice menus and it has 4 items. See below: :

"SYSTEM"-----Display input, output data of the system

" UPS MODULE"------Module's ouput voltage, current, temperature data,etc.

"EVENTS"------Events record of the system

"SETUP"-----Set the system data ( Inclduing time, battery,

communicationinterface)

3. Detailed information screen of system.

Choose"1 > SYSTEM" at optional information menu, then press"ENT" to enter detailed information screen..It's dedivided into3 parts, and they are : output screen,input screen,battery screen.

Note :Now ,it displays output screen , and press " \* "key to enter input screen; , press again " \* " to enter battery screen.

Ouput screen interface is like below:

#### EA660 Modular UPS



Input status screen interface below :



Note : Input status screen, , it displays input voltage, bypass input and frequency

Battery status screen interface is below :



Note : DC status screen, displaying charging and discharging voltage and current.

#### 4. Module information screen

Choose 2 > UPS MODULE" at information menus, and press "ENT" to enter module infromation screen and each screen can display 4 modules' information at one time. Pressing "-"

or  $\P$  ( $\pm/\overline{F}$ ) to check other modules' information data ; and pressing  $\P$  (left/right) to display voltage or current.

Interface to display Module's voltage is below :

	ΨF	's Modi	JLE			J	Inverter	Bypass	Alan
#01	000V	000V	V000	21°C					
#02	000V	000V	V000	21°C	🕒	ESC			
#03	000V	000V	V000	<b>21</b> °C					
<b>#</b> 04	000V	000V	V000	22 U		Ent			

Interface to display Module's current is below :



5. Events record screen of system

Choose "3 > EVENTS" at optional menu, press "ENT" to enter.

Interface display as below :



Note : Screen can display 100 records at most , when it's over 100, the oldest recordwill be covered by new records.All records will be displayed by reverse time.

All the records explanation, pls check the following chart

Events record	Meanings	Trouble shooting
	0	6

AC R OVER VOLT	R phase's input over voltage	1.check the AC input line-line voltage at the top of the MCCB.
AC S OVER VOLT	S phase's input over voltage	2.check the UPS AC input line-line voltage between the terminals' top.
AC T OVER VOLT	T phase's input over voltage	3.check the UPS AC input line-line voltage between the terminals' bottom.
AC R OWE VOLT	R phase AC input voltage low	1.Check the input MCCB of AC input whether shut off or not
AC S OWE VOLT	S phase AC input voltage low	2.check the AC input line-line voltage at the top of the MCCB.
AC T OWE VOLT	T phase AC input voltage low	<ul><li>3.check the UPS AC input line-line voltage between the terminals' top.</li><li>4.check the UPS AC input line-line voltage between the terminals' bottom.</li></ul>
UPS R OVER VOLT	R ph inverter output over voltage	
UPS S OVER VOLT	S ph inverter output over voltage	
UPS T OVER VOLT	T ph inverter output over voltage	1, check the monitioned line-line voltage of the
UPS R OWE VOLT	R ph inverter output low voltage	2, check the modules' status
UPS S OWE VOLT	S ph inverter output low voltage	
UPS T OWE VOLT	T ph inverter output low voltage	
BYP R OVER VOLT	R ph byoass input over voltage	1, check the byass input line-line voltage at the top of the MCCB.
BYP S OVER VOLT	S ph byoass input over voltage	2check the byapss input line-line voltage between the terminals' top.
BYP T OVER VOLT	T ph byoass input over voltage	3.check the byapss input line-line voltage between the terminals' bottom.
BYP R OWE VOLT	R ph byoass input low voltage	1.Check the byapss input line-line voltage of MCCB whether shut off or not
BYP S OWE VOLT	S ph byoass input low voltage	2.check the byapss input line-line voltage at the top of the MCCB.
BYP T OWE VOLT	T ph byoass input low voltage	<ul><li>3.check the bypass input line-line voltage between the terminals' top.</li><li>4.check the bypass input line-line voltage between the terminals' bottom.</li></ul>

Events record	Meanings	Trouble shooting
R OVER LOAD	R ph output overloaded	1. check ouput current of the load at the monitored
S OVER LOAD	S ph output overloaded	detailed screenwthether is beyond the system's

T OVER LOAD	T ph output overloaded	requirment.
DCP OWE VOLT	DC+ low voltage	
DCP OWE DOWN	DC+voltage, equipped to shut off	1, check the DC MCCB of the DC+&DC- whether
DCP OVER VOLT	DC+ low voltage	shut off
DCN OWE VOLT	DC- low voltage	$2_{x}$ check the DC+&DC- voltages the terminals top.
DCN OWE DOWN	DC- low voltage, equipped to shut off	bottom.
DCN OVER VOLT	DC-over voltage	
DC P OVER N	DC gap high DC+ > DC-	1, check DC voltage at the overall monitoring screen
DC N OVER P	DC gap high DC+ < DC-	<ul> <li>2、 check the DC+&amp;DC- voltages the terminals' top .</li> <li>3、 check the DC+&amp;DC- voltages the terminals' bottom</li> </ul>
RHV LOAD BYP	R ph over voltage and transfer to bypass	
SHV LOAD BYP	S ph over voltage and transfer to bypass	
THV LOAD BYP	T ph over voltage and transfer to bypass	1, check the inverter output wave on load.
RLV LOAD BYP	R ph low voltage and transfer to bypass	2、 check module's status
SLV LOAD BYP	S ph low voltage and transfer to bypass	
TLV LOAD BYP	T ph low voltage and transfer to bypass	
DC OWE CMD C	DC low, command of start cancelled	
DC OVER CMD C	DC high, command of start cancelled	1.check DC voltage at the overall monitoring screen 2.check the DC+&DC- voltages the terminals' top.
DC+/- GAP CMD C	Dc gap high, command of start cancelled	3.check the DC+&DC- voltages the terminals' bottom
BYP ERR CMD C	Byapass fault, command ofstart cancelled.	<ol> <li>1.check the bypass voltage at the input monitoring screen</li> <li>2.check UPS 3ph voltage of the bypass teminals' top.</li> <li>3. check UPS 3ph voltage of the bypass teminals' bottom.</li> </ol>
AC ERR CMD C	AC abnormal, command Of constant charigng, cancelled.	<ol> <li>1.check the AC voltage at the input monitoring screen</li> <li>2. check the UPS 3phase voltage of the AC termnials' top</li> <li>3. check the UPS 3phase voltage of the AC termnials' bottom.</li> </ol>
SYNC ERROR	Inverter&bypass unsynchronaztion	<ol> <li>check the waves of the iverter and bypass</li> <li>check the inverter and bypas's phase sequence.</li> </ol>

SYNC OK	Inverter&bypass	
OUT PHASE	Intver,&bypass out phase	
PHASE OK	Inverter byapss phase sequence recover	
XX M R OVERLOAD	NO.XX module's Rph overload	
XX M S OVERLOAD	NO.XX module's Sph overload	Check the cureent diplay interface and correspondingmodule and ph whether overload.
XX M T OVERLOAD	NO.XX module's Tph overload	
XX M FAN ERROR	NO.XX module's fan alarm	Check fan wthether is jamed by anything.
XX M OVER TEMP	NO.XX module's temperature alarm	Check module's temperature above 55.
XX M PFC OFF	XX module's PFC off	Check the AC voltage at monitoring input screen. Check the DC voltage at monitoring input screen.
XX M ERR OFF	XX module shut off by error	Check the AC voltage at monitoring input screen. Check the DC voltage at monitoring input screen.

Events record	Meanings	Trouble shooting		
COMMUNICATE OK	Communication normal	Check Module normal or not		
COMMUNICATE ERR	Communication abnormal			
MAN LOAD BYP	Transferred to bypass by manual	Check whether have such operation		
SWITCH BREAK	MCCB breaks	check any response of corresponding inpit dry contacts		
UPS ON LINE	Inverter working			
UPS ON	UPS working			
UPS OFF	UPS switched off			
AUTO CHARGE	Automatic constant charging	No pood		
AUTO FLOAT	Atuomatic float charging	No need		
MANUAL CHARGE	Manual constant charging			
MANUAL FLOAT	Manual float charging			
XX M MANUAL OFF	XX module shut off by mamual			

6. System data setting screen

Choose "4 > SETUP" at information chooseing menu, press "ENT" to enter system data setting screen (How to set we have mentined at ahead chapters. If need to know, plz refer Item 2 of "seventh" system start and setting )

## **10 Index**

10.1 Systerm index:

#### **Basic index**

Input and output cable modes : 3ph/1ph ,3ph/3ph,1ph/3ph;

Output capacity: EA66-200system: within 200KVA;

EA66-150 system : within 150KVA ;

EA66-100 system : within 100KVA ;

EA66-060 system : within 60KVA.

Diagram structure : Online mode

Output wave : pure sine wave

Dimension: ( W\*D\*H mm ): 600×800×2000

#### AC input

Voltage range :  $220V \pm 20\%$ , L-N

Input mode : 3ph+n+G/ 1ph+N+G

Frequency: 45Hz~55Hz

Input PFC : =0.99

THD: <3%

Soft start : > 60sec

#### **Battery input**

Rated input voltage :  $\pm 384V$ 

Input voltage range :  $345V \sim 440V$ 

#### AC output

Output modes : single phase , 3 phase Output : single phase , 220V ; 3 phase , 380V Power factor : 0.8 (Inductive load , capacitve load) Voltage distortion : linear load=3% , Non- linear load=5%

Output frequency: within  $50HZ\pm 2\%$ , output follow AC frequency, phase potential difference less than 3 degrees; AC mains out of limitaion or battery provide power, output frequency  $50Hz\pm 0.2\%$ .

Crest factor: 3 : 1

Unit efficeny : =95% (AC mode)

=98% ( battery mode )

Constant precision : =5%

Transfer time AC to battery mode : 0ms

Bypass to inverter : <1ms

Dynamic response of instant variation range : Load variation between 0% ~ 100% or

100% ~ 0% v, output voltage variation = 2%

Un-balance load capacity: can carry 100% un-balance laod

Noise (1m): =55DB

Display mode: 240x64 lattic LCD

EMC: EN 62040-2:2006

Security Criterion Requirment :

EN 62040-1-1:2003

IEC 60950-1:2001

#### 10.2 Module index

#### **Input Traits:**

AC input Input mode : 3 phases+N+G/1ph+N+G Input voltage : 220V± 20%(singl phase) AC frequency : 45 ~ 55Hz PF : =0.99 Efficeny : =98% ( DC supply ) =95%(AC supply ) DC input

Voltage :  $\pm 384V$ 

Voltage range :  $345V \sim 440V$ 

#### **Output traits**

AC output voltage : 1 phase , 220V ; 3 phase , 380V

Ouptput PF: EAM20 Module: 20KVA;

EAM15 Module : 15KVA ;

EAM10 Module : 10KVA ;

EAM06 module : 6KVA。

Output PF: 0.8

Output mdoe : 3ph+N+G/1ph++N+G

Output frequency : If AC frequency within 50HZ±2%, output will follow and phase angle

less than 3 degrees ; Battery mode  $50Hz\pm 0.2\%$ 

Voltage distortion : Linear load =3% , Non-linear load =5%

Crest factor: 3:1

Dynamic response of instant variation range : Load variation between  $10\% \sim 100\%$  or  $100\% \sim 10\%$ v, output voltage variation =2%

Noise (1m): =55dB

Temperature: coefficient (1/): =± 0.2‰

#### **Proetection Traits**

Overload 125%, after1 minute, shut off

Over and low voltage protection : inverter output over voltage . shut to protect..

inverter output low voltage . shut to protect.

AC input voltage high, transfer to battery popwer supply; When AC recover normal, it willtransfer to mains mode automatically.

Over temperature protection : if module's temperature over 65 centigrade , UPS will shut off.

Cooling mode : Forced air

**Alarm function** 

Inverter output over voltage : When inverter output voltage > 235V, module will shut automatically, alram light on ;

Inverter output low voltage : when inverter output < 176V, module will shut automatically, alram light on ;

Over current alarm : If load is above rated 105%, alarm right be on;

Over temperature : when module temperature is above 55centigrade, alarm.

Note: above alarm function, with alarm light on.

# 11 Operating mode

## 11.1 Normal mode

Normal mode, namely it's main input .after Q2 switch on , via AC/DC rectifier , output , aditonal load and AC input provide power , and system work normally.



# 11.2 Battery working mode ( no stable states)

Battery working mode means there is no AC input from system. After turning on switch Q4, Q5, the DC will converter into AC, finally out put to the outside load, and all the system normally.



## 11.3 Maintain Bypass

Users set a bypass switch. Input and the bypass of UPS are belong to the same circuit. Whilel maintenance, please firstly press the manual bypass switch SA, and let the system working in the bypass working mode. And then turn on Q6, service power will send to outside load, and finally system will not work any more.



## **12 Maintenance**

12.1 Please take the capacity and characteristic of the load into consideration.

The output power rating is an important parameter of estimate how big is the capacitor of load can be drived. And it will change along with the changing of load. For example, a 1KVA UPS may not drive a 1KVA load. UPS shouldn't be in a full load working mode for too much long time in order to prolong the using time. Off line UPS had better work in 60% to 70% load and line interactive UPS 70% to 80%. And UPS shoudn't be in a too lower working mode.

## 12.2 Protect UPS from lightning strike.

As lightning strike is a big danger to all the electrical equipment. Please pay much attention to ensure that UPS has effective shield and ground connection. Because of phenomenon of electromagnetic induction, lightning strike will cause induction of high potential pulse which will input into UPS along with the source wire or communication wire. And this has a bad impact the UPS as it has many micro-electronics elements like CMOS IC modular and contoling CPU which are sensitive to the electromagnetism pulse. Though our UPS has a good function of effective shield and ground connection, users should do some work to protect source wire and communication wire( eg: remote monitoring signal lines ).

## 12.3 Notice of maintenance and maintain

- Please do use the UPS according to requirements of the instruction and maintenance note, and ensure the correct sequence of L, N and G, do not change its sequence at you willing.
- Please turn on/off the UPS strictly according to the correct sequence operation. Avoid any damage of UPS caused by large fluctuation of output voltage as the rise or reduce of load capacity momently.
- ♦ Mustn't turn on or off the UPS frequently. There shoud be 30s between shut down and next starting. Or

UPS may in a start failure mode, that is there is no AC input and output.

- Avoid in the overload mode. It should be under 80%, or it will cause the inverter parts damaged while in the inverter state. Practice improves that, for most UPS, the best working mode is having an output power rateing between 30%-60%.
- Requirements of discharge of battery: ordinally, UPS has a protect function, while discharge to self protect shut down, battery will recover to a certain voltage, while it can't be restarted again, or it battery will over discharge. The battery should be charged again and then can working normally.
- ☆ If it is a new UPS or has been stored for some time, usre should first charge and then use it. Or can't guarantee the backup time.
- ☆ If there is no fallen of AC input for a long tiem, users should discharge battery every 3-6 months and then charge again. This could prolong the woking life.
- ☆ If UPS instored for a long time, please start it and charge it every 3 or 6 months. Or UPS will be damaged.
- Please do the maintenance regularly, clearup the dust inside the UPS, test the voltage of battery and fans' working situation, test and adjust the system parameter, and so on.

## 12.4 Battery Management

Every power module dedicated internal charging rectifier, high reliability, no high frequency harmonics, avoid high frequency wave affects battery lift. and avoid overheat whiling charging to expand battery life.

User can intelligently manage according to user setting and battery real state.

1 . Battery Charging mode—floating and constant charging

Floating Chargines Principle: When batteries are saturation ,Charger doesn't work.It still provides constant floating voltage and little charging current to compensate battery discharge.

Constant chargine principle: Owing to single unit of battery groups comes forth characteristic change in use. Constant charings strike a balance between single unit characteristics to ensure battery internal resistance balance. This model is also benefical of activate the chemical propertiies of batteries.

2. Auto Control Battery are constant and floating chargin.

UPS system can be automatically converted floading charing in accordance with the battery state. When battery is floating charging, the charging current automatically set higher than both the current value of the converstion floating. Battery charging status converter floating charging to constant charging. When battery is constant charging, the charing current lower than the threshold value of automatical conversion. And keeps 3 hours. The charging status converter constant charging to floating charging. Automatical convertion constant and floating charging can give full play to the floating and contant charging's advantages. to complete fast charging and expand battery life

3 . Battery constant charging process.

Battery constant charging process is constant current charging and then constant voltagecharging.

First of all, constant current charging process. At that stage, the charging current has been set close to the limiting value, the battery voltage was gradually increased over time. Followed b the constant voltage process, in the stage, the charging voltage limiting is fast approaching charging voltage, charging current is gradually reduced, at that stage that the battery is close to saturation state, its battery charging voltage is as follows:



#### 4 . Battery constant charging time

The Battery constant charging time is less than 3 hours. It also is more than 24 hours.

EA66series's battery group( $\pm$  384V) share with all UPS modular including charging and discharge. The user use one or more parallel groups to provide battery backup time according to own need.

Tips: Please should be off as rings, watches and the like metal goods before replacement battery, the use of insulation with the handle of the screwdriver, not a tool or other metal objects on the battery, connect normal phenomenon, personal safety and UPS won't be harm. It can not be regative battery is short circuit or the reverse connection.

Noitice: The manual is only EA66-150 as a referencee, The EA66-200, EA66-100, EA66-060 are same except printing and description some parameters in user manual

## 13 after service

1、 In Compliance with the custody,installation,use and operation rules of the conditions, since the date of delivery within 2 years, the quality due to bad or improper occurred in damaged or not functioning properly when we have the responsibility to user for free in time for debugging, repair or replacement of components, warranty period,our products paid under an obligation to safeguard life

2、Our Company's performance pledge is products warranty of 2 years, the lifelong maintenance.Respond to user maintenance requirements within 2 hrs, the need to arrive at the scene within 24hrs to arrive at the scene, solve the failur within 48 hours, all-weather servcie.