NAT POWER
Renewable Energy

User Manual

Pure Sine Wave Inverter & Charger

3000W/4000W/5000W/6000W

Table Of Contents

NAT POWER

Renewable Energy

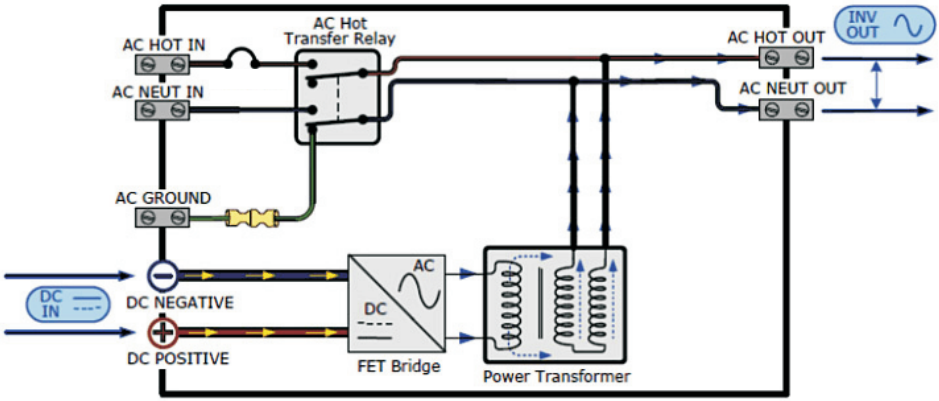
SAFETY INSTRUCTIONS

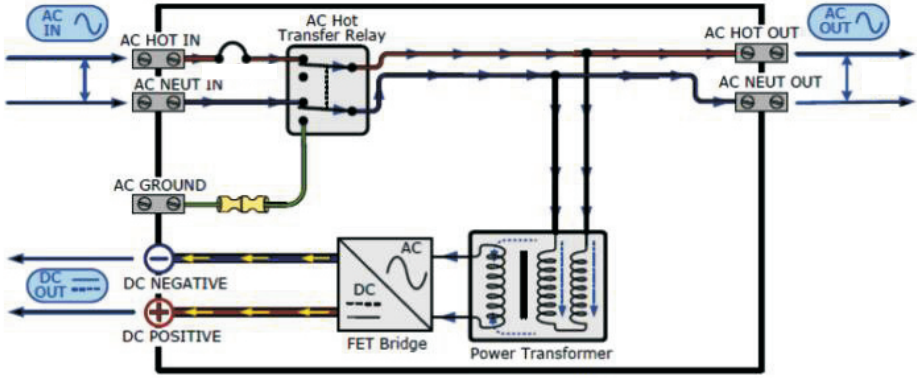
WARNING: This chapter contains important safety and operating instructions. Read and keep this manual for future reference.

1. Before using the unit, read all instructions and cautionary markings on the unit, the batteries and all appropriate sections of this manual.
2. **CAUTION** –To reduce risk of injury, charge only deep-cycle lead acid type rechargeable batteries. Other types of batteries may burst, causing personal injury and damage.
3. Do not disassemble the unit. Take it to a qualified service center when service or repair is required. Incorrect re-assembly may result in a risk of electric shock or fire.
4. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
5. **CAUTION** – Only qualified personnel can install this device with battery.
6. **NEVER** charge a frozen battery.
7. For optimum operation of this inverter/charger, please follow required spec to select appropriate cable size. It's very important to correctly operate this inverter/charger.
8. Be very cautious when working with metal tools on or around batteries. A potential risk exists to drop a tool to spark or short circuit batteries or other electrical parts and could cause an explosion.
9. Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
10. GROUNDING INSTRUCTIONS -This inverter/charger should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
11. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.
12. **Warning!!** Only qualified service persons are able to service this device. If errors still persist after following troubleshooting table, please send this inverter/charger back to local dealer or service center for maintenance.

INTRODUCTION

1.Basic System Architecture





1.1 Instruction to working mode

Inversion priority mode

(1)In case of normal battery voltage, the inverter operates under inversion mode and load power is supplied by battery inversion ;

(2)the system automatically switches to battery-powered mode if the battery is fully charged by solar energy or wind Energy through controller.

(3)the battery can also be charged when inverter operates under electric supply mode, which is determined by mode Setting of charging current. the charging current can be 0A if charging is unnecessary

Electric supply priority mode

(1)In case the load is powered by electric supply, the electric supply has to pass input protection device, And filter before supplying power to load in order to ensure power stability. it can be also charge the battery(determined By charging mode)

(2)in case of outage or abnormity of electric supply ,the system automatically switches to battery-powered mode

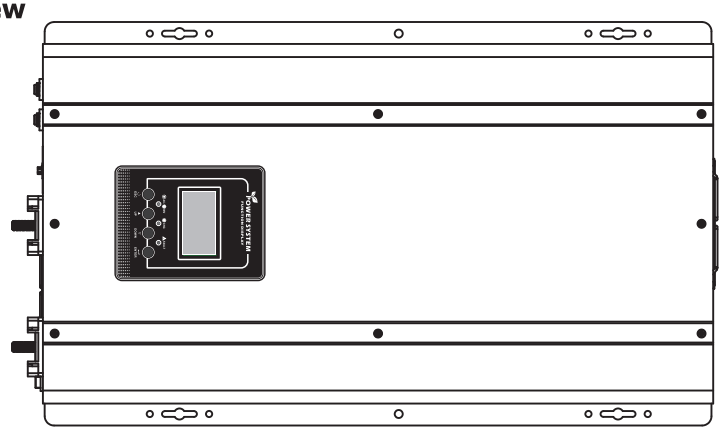
(3)in case electric supply is normal ,the system automatically switches to electric supply mode to supply power to load

2.Product Features

1. Pure sine wave inverter
2. Configurable input voltage range for home appliances and personal computers via LCD setting
3. Configurable battery charging current based on applications via LCD setting
4. LCD and LED Display
5. Over temperature auto restart
6. Overload/ Over temperature/ short circuit protection

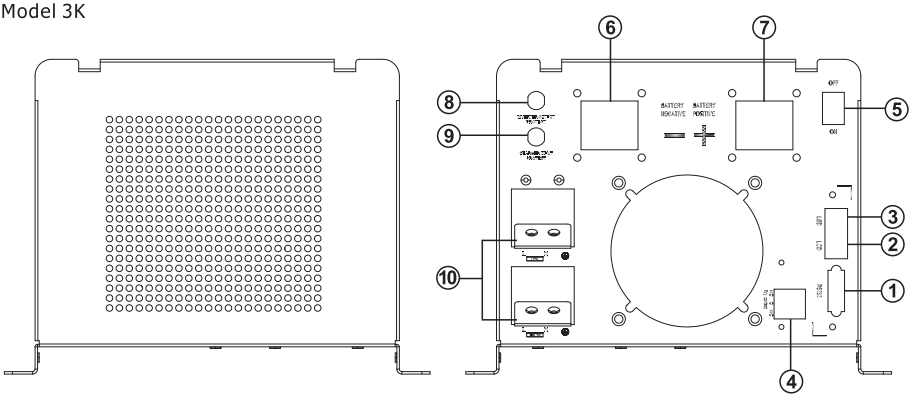
PRODUCT OVERVIEW

1.Top view

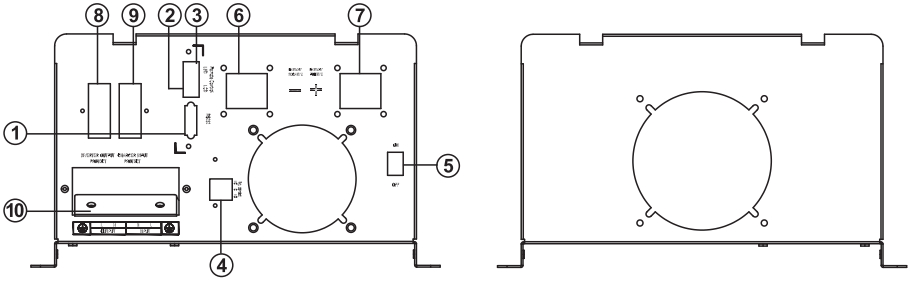


2.Real view

Model 3K



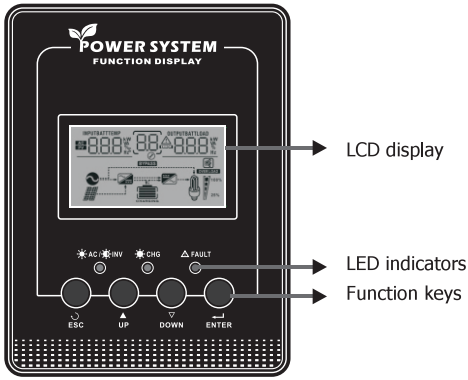
Model 4-6K



1.RS232 port
2.LCD remote control
3.LED remote control
4.Dry contact
5.On/Off
6.Battery negative
7.Battery positive
8.Inverter output protect
9.Charger input protect
10.Input/Output

Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes three indicators, four function keys and a LCD display, indicating the operating status and input/output power information.



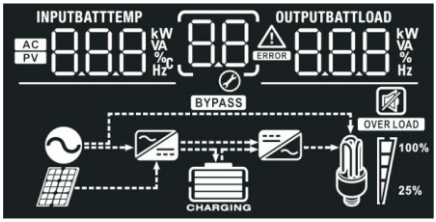
LED Indicator

LED Indicator			Messages
AC / INV	Green	Solid On	Output is powered by utility in Line mode.
		Flashing	Output is powered by battery or PV in battery mode.
CHG	Green	Solid On	Battery is fully charged.
		Flashing	Battery is charging.
⚠ FAULT	Red	Solid On	Fault occurs in the inverter.
		Flashing	Warning condition occurs in the inverter.

Function Keys

Function Key	Description
ESC	To exit setting mode
UP	To go to previous selection
DOWN	To go to next selection
ENTER	To confirm the selection in setting mode or enter setting mode

LCD Display Icons



Icon	Function description
Input Source Information	
AC	Indicates the AC input.
PV	Indicates the PV input
INPUTBATT 888 kW VA %C Hz	Indicate input voltage, input frequency, PV voltage, battery voltage and charger current.
Configuration Program and Fault Information	
88	Indicates the setting programs.
88 ERROR	Indicates the warning and fault codes. Warning: 88 flashing with warning code. Fault: 88 ERROR lighting with fault code
Output Information	
OUTPUTBATTLOAD 888 kW VA % Hz	Indicate output voltage, output frequency, load percent, load in VA, load in Watt and discharging current.
Battery Information	
CHARGING	Indicates battery level by 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.

In AC mode, it will present battery charging status.

Status	Battery voltage	LCD Display
Constant Current mode / Constant Voltage mode	<2V/cell	4 bars will flash in turns.
	2 ~ 2.083V/cell	Bottom bar will be on and the other three bars will flash in turns.
	2.083 ~ 2.167V/cell	Bottom two bars will be on and the other two bars will flash in turns.
	> 2.167 V/cell	Bottom three bars will be on and the top bar will flash.
Floating mode. Batteries are fully charged.		4 bars will be on.

In battery mode, it will present battery capacity.

Load Percentage	Battery Voltage	LCD Display
Load >50%	< 1.717V/cell	
	1.717V/cell ~ 1.8V/cell	
	1.8 ~ 1.883V/cell	
	> 1.883 V/cell	
50%> Load > 20%	< 1.817V/cell	
	1.817V/cell ~ 1.9V/cell	
	1.9 ~ 1.983V/cell	
	> 1.983	
Load < 20%	< 1.867V/cell	
	1.867V/cell ~ 1.95V/cell	
	1.95 ~ 2.033V/cell	
	> 2.033	

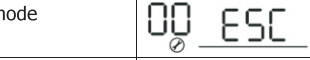
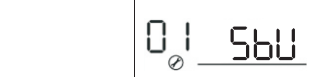
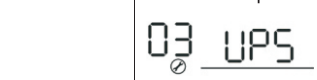
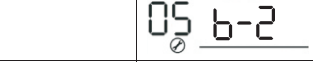
Load Information				
OVER LOAD	Indicates overload.			
100% 25%	Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%.			
	0%-24%	25%-49%	50%-74%	75%-100%
				
Mode Operation Information				
	Indicates unit connects to the mains.			
	Indicates unit connects to the PV panel.			
BYPASS	Indicates load is supplied by utility power.			
	Indicates the utility charger circuit is working.			
	Indicates the DC/AC inverter circuit is working.			
Mute Operation				
	Indicates unit alarm is disabled.			

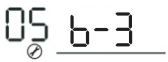
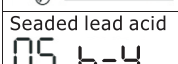
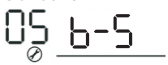
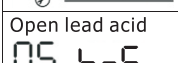
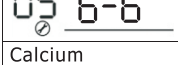
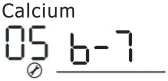
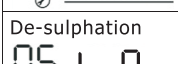
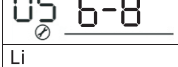
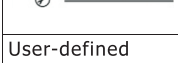
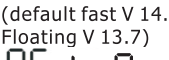
LCD Setting

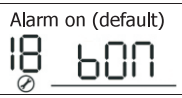
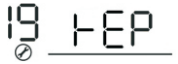
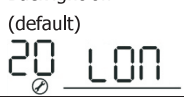
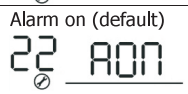
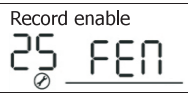
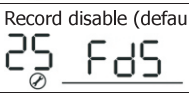
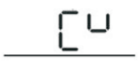
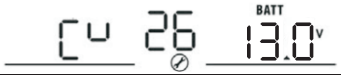
After pressing and holding ENTER button for 3 seconds, the unit will enter setting mode. Press "UP" or "DOWN" button to select setting programs. And then, press "ENTER" button to confirm the selection or ESC button to exit.

After setting out the output frequency, the output voltage, the charge current and the AC input voltage range, it is necessary to turn off the electricity and restart the inverter.

Setting Programs:

Program	Description	Selectable option		
00	Exit setting mode	Escape 		
01	Output source priority: To configure load power source priority	Utility first (default) 	Utility will provide power to the loads as first priority. battery energy will provide power to the loads only when utility power is not available.	
		Battery priority 	battery energy provides power to the loads as first priority. Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12.	
03	Input voltage range	Wide Utility effective range: Nominal output voltage: -23%to+15% 		
		Narrow(default) Utility effective range: Nominal output voltage:-15%to+15% 		
04	Power saving mode enable/disable	Saving mode disable (default) 	If disabled, no matter connected load is low or high, the on/off status of inverter output will not be effected.	
		Saving mode enable 	If enabled, the output of inverter will be off when connected load is pretty low or not detected.	
05	Battery type	Type of battery	Fast V	Floting V
		Gel U.S.A 	14.0	13.7
		A.G.M.1 	14.1	13.4

		A.G.M.2 	14.6	13.7
		Seaded lead acid 	14.4	13.6
		Gel euro 	14.4	13.8
		Open lead acid 	14.8	13.8
		Calcium 	15.1	13.6
		De-sulphation 	15.5 for 4 hrs	
		Li 	When the battery voltage reached to 14.7V. UPS closes the charge.UPS open charging when the battery voltage down to 12.5V.	
		User-defined (default fast V 14.3, Floating V 13.7) 	If User-Defined is selected ,user can set the battery type in program 94	
07	Auto restart when over temperature occurs	Restart disable (default) 	Restart enable 	
09	Output frequency	50Hz (default) 	60Hz 	
11	Maximum utility charging current	Refer to Appendix ,the default is the maximum value , with 5A base, it can be up/down set, the minimum is 0A, the maximum can not exceed(Pout*0.42/VDC) 		
12	Low battery voltage inverter transfer to Utility	The default is low battery voltage alarm point setting range is from 10.5Vto 12.5Vfor 12V (*2for 24V,*4 for 48V),if the voltage set by user is below default point ,the default is low battery voltage alarm point. Increment of each click is 0.1V for 12V (*2for 24V,*4for 48V) 		

13	High battery voltage recovery	Output of Battery model if battery voltage is set higher 13.5v-15.5v, otherwise it is output of bypass setting range is from 13.0Vto 15.5Vfor 12V (*2for 24V, *4for 48V),if the voltage set by user Increment of each click is 0.2V for 12V (*2for 24V,*4for 48V) 	
18	Alarm control	Alarm on (default) 	Alarm off 
19	Auto return to default display screen	Return to default display screen (default) 	If selected, no matter how users switch display screen, it will automatically return to default display screen (Input voltage /output voltage) after no button is pressed for 1 minute.
		Stay at latest screen 	If selected, the display screen will stay at latest screen user finally switches.
20	Backlight control	Backlight on (default) 	Backlight off 
22	Beeps while primary source is interrupted	Alarm on (default) 	Alarm off 
25	Record Fault code	Record enable 	Record disable (default) 
26	Bulk charging voltage(C.V voltage) 	If User-defined is selected in program94,this program can be set up.setting range is from 13.0V to 15.5V for 12V (*2 for 24V,*4 for 48V) 	
	Maximum charging voltage for lithium battery,when the battery voltage reached the charge voltage,it closes the charge 	If User-defined is selected in program 94,this program can be set the maximum charging voltage.setting range is from 13.0V-15.5V 	

<table>
<tr><td rowspan="2">27</td><td>Floating
charging voltage
  </td><td>If User-defined is selected in program 94,this program can be set up.setting range is from 13.0V to 15.0V for 12V(2* for 24V,*4for 48V)
  </td></tr>
<tr><td>Battery low
voltage open
charging
(for lithium battery)
  </td><td>If User-defined is selected in program 94,this program can be set up.setting range is from 12.0V to 14.0V for 12V(2* for 24V,*4for 48V)
  </td></tr>
<tr><td>29</td><td>Low DC cut-off voltage</td><td>The default single section is 10.0V .setting range is from 10.0Vto 12Vfor 12V (*2for 24V,*4for 48V)
Increment of each click is 0.1V for 12V
(*2for 24V,*4for 48V)
  </td></tr>
<tr><td rowspan="2">93</td><td rowspan="2">Frequency Range</td><td>Special 40-70HZ
  </td></tr>
<tr><td>General 50HZ 45-55HZ/ 60HZ 55-65HZ
  </td></tr>
<tr><td rowspan="2">94</td><td rowspan="2">Selection of battery type</td><td>Lithium battery
  </td><td>If selected, battery charge voltage and battery low open charging can be set up in program 26,27</td></tr>
<tr><td>Other battery
  </td><td>If selected ,battery charge voltage can be set up in program 26,27</td></tr>
<tr><td>95</td><td>Battery high voltage trip</td><td>When dry contact switch from NC to NO, battery voltage arrive to setting voltage, dry contact point switch to NC. This setting can not be higher than fast charge voltage. setting range is from 13.0V to 15.5V for 12V (*2for 24V, *4for 48V)
Increment of each click is 0.1V for 12V (*2for 24V, *4for 48V)
  </td></tr>
</table>

96	Battery low voltage trip	When battery voltage arrive to setting point, the dry contact switch from NC to NO. This setting can not be lower than low battery voltage cut off point. setting range is from 10.5V to 12.5Vfor 12V (*2for 24V,*4for 48V) Increment of each click is 0.1V for 12V (*2for 24V,*4for 48V) 
97	Dry contact control	If inverter is set in dcd, dry contact function is disable, 95,96 can not be set up in program. 
		If inverter is set in dce, dry contact function is enable and 95,96 can be set up in program. 
98	Low battery alarm	The default is 10.5V The setting range is 10.5-12.5V for12V (*2for 24V,*4for 48V).if the shutdown voltage set by the user is lower than the default voltage point ,the default will be low voltage shutdown point +0.5V Increment of each click is 0.1V for 12V (*2for 24V,*4 for 48V) 
99	Output voltage setting	The default is 230V/120V setting range is from 200V/ 100Vto 240V/120V Increment of each click is 5V for 120V machine Increment of each click is 10V for 230V machine 

Fault Reference Code

warning code	warning event	Icon on
03	Battery voltage overcharge	
04	Battery voltage is too low	
05	Inverter over temperature	
07	Inverter over load	
12	PV input voltage is too low	
13	PV input voltage is too higher	
14	PV over current	
15	PV over temperature	
88	Transformer phase reversal	
89	Frequency is out of range	
97	Inverter fail to communicate with MPPT	

Fault Code	Fault Event	Icon on
02	Heat sink over temperature	
03	Battery voltage is too higher	
04	Battery voltage is too low	
05	Output short circuit	
06	Output is too high or too low	
07	Overload	
99	Inverter fail to slow start	

SPECIFICATIONS

MODEL		3012E	3024E	3048E	4024E	4048E	5024E	5048E	6024E	6048E
Rated Output Power		3000W			4000W		5000W		6000W	
Transfer Time		10ms typical								
Invert mode	Nominal output voltage rms	120/230VAC(100~120VAC 5V Gear setting ; 200~240VAC 10V Gear setting)								
	Output frequency	50HZ±0.3HZ or 60HZ±0.3HZ								
	Output wave form	Pure Sine wave								
	Output overload	105%＞Load＜120%±10%: Fault(turn off output after 10 seconds) 120%＞Load＜150%±10%: Fault (turn off output after 3 seconds) 150%＞Load±10%: Fault (turn off output after 1 seconds)								
	Short circuit protection	Software protection								
	Nominal efficiency	>88%								
	Power factor	0.9-1								
Line mode	Input voltage range	Narrow range					Wide range			
		Nominal output voltage±15%					Nominal output voltage +15%，-23%			
	Input frequency voltage	40Hz-70Hz								
	Input wave form	Sine wave(Utility or generator)								
	Short circuit protection	Circuit breaker								
	Output Overload	120%＞ Load ＜150%±10%: fault (turn off output after 60 seconds); 150%＞Load ±10%: fault(turn off output after 1 seconds)								
	Over Charge protection shutdown	16.0for12Vdc/*2for24V/*4for48V								
	Efficiency online transfer mode	>95%								
	AC Charge	Charge current can be set（5A UP/DOWN setting，For specific parameters, please refer to Appendix）								
		Selection of battery charging Voltage type								
	Battery type	Fast V					Float V			
	Gel U.S.A	14.0					13.7			
	A.G.M 1	14.1					13.4			
	A.G.M 2	14.6					13.7			
	Sealed Lead Acid	14.4					13.6			
	Gel Euro	14.4					13.8			
	Open Lead Acid	14.8					13.3			
	Calcium	15.1					13.6			
	De sulphation	15.5 for 4 hrs then off								
	Li	14.7								
	other	User-defined								

Battery	Nominal DC Input Voltage	12V	24V	48V	24V	48V	24V	48V	24V	48V
	Battery voltage range	12V(10Vdc ~16Vdc) ±0.3Vdc /*2for24V/*4for48V								
	Low DC Warning Voltage	12V(10.5Vdc ± 0.3Vdc)/*2for24V/*4for48V								
	Low DC Cut-off Voltage	12V(10Vdc±0.3Vdc)/*2for24V/*4for48V								
Others	Operating Temperature Range	0~40℃								
	Humidity	0%～95%								
	Noise	<50dB								
	Dimension (D*W*H), mm	500*258*190			574*345*197					

Appendix

Model	Power value	Charge current
3012/3012E	3000W	75A
3024/3024E		50A
3048/3048E		25A
4024/4024E	4000W	70A
4048/4048E		35A
5024/5024E	5000W	75A
5048/5048E		45A
6024/6024E	6000W	75A
6048/6048E		50A

*Product specifications are subject to change without further notice

NAT POWER
Renewable Energy