



Home Inversion Power System

User Manual

BSI103/BSI203

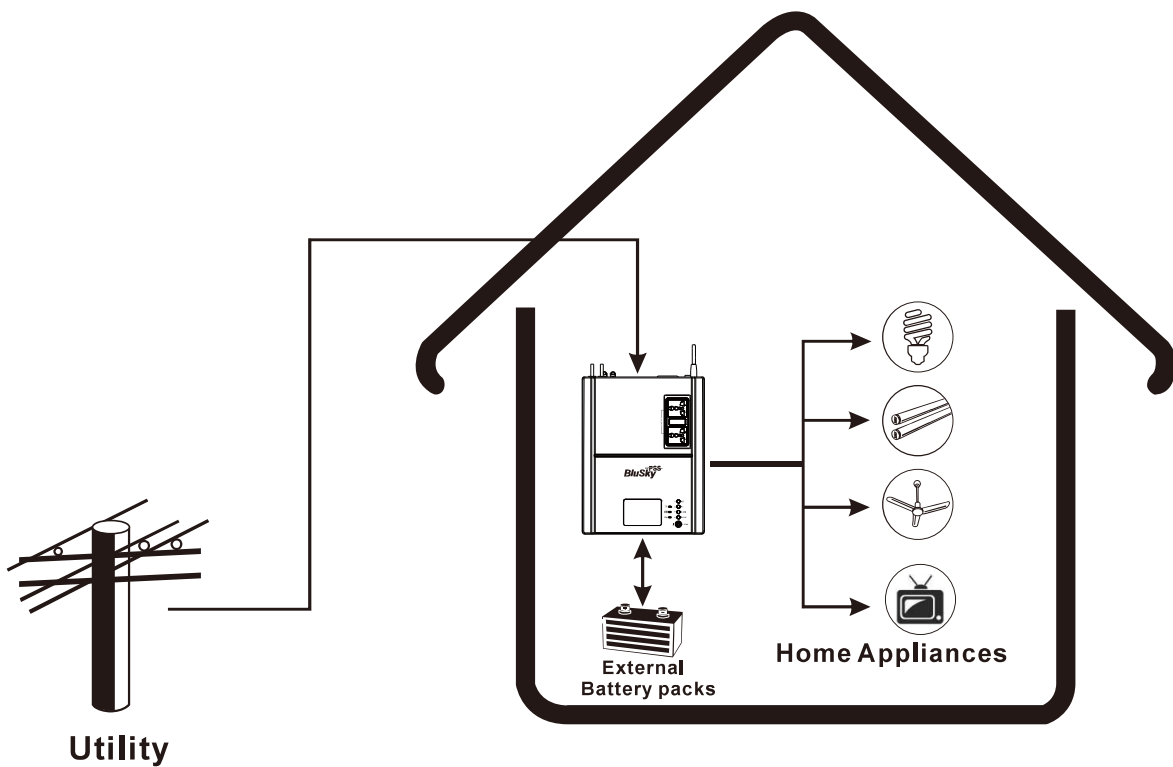


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1. Introduction

This is a DC-to-AC inverter (hereinafter referred to as “**inverter**”), the inverter accepts input power source from AC mains (utility), battery, operation modes automatically depending on the operational conditions.

Key features:

- ★ Selectable input voltage ranges, charging current setting
- ★ Auto restart when AC recovery
- ★ User-friendly LCD and LED indications with setting function
- ★ With the environmental temperature control charge management
- ★ Rack design & wall-mounted design for flexible installation
- ★ Intelligent 3-stage charger control for efficient charging and preventing overcharge
- ★ Multiple protection: low battery alarm, low battery shutdown, over charge protection, overload protection, over temperature protection, short circuit protection
- ★ Fan speed automatic adjust, Low noise
- ★ Battery Cut off point setting
- ★ Buzzer alarm ON/OFF setting

2. Important Safety Warning(Save These Instructions)

Before using the inverter, please read all instructions and cautionary markings on the unit, this manual and the batteries.

Conventions used:

WARNING! Warnings identify conditions or practices that could result in personal injury.

CAUTION! Caution identify conditions or practices that could result in damaged to the unit or other equipment connected.

General Precaution-

WARNING! The unit is designed for indoor use. Do not expose this unit to rain, snow or liquids of any type.

WARNING! To reduce risk of injury, only use qualified batteries from qualified distributors or manufactures. Any unqualified batteries may cause damage and injury. Do not use old or overdue batteries. Please check the battery type and date code before installation to avoid damage and injury.

WARNING! It's very important for system safety and efficient operation to use appropriate external battery cable. To reduce risk of injury, external battery cables should be UL certified and rated for 75°C or higher. And do not use copper cables less than 10AWG.

WARNING! Do not disassemble the inverter. Contact with the qualified service center when service or repair is required.

WARNING! Provide ventilation to outdoors from the battery compartment. The battery enclosure should be designed to prevent accumulation and concentration of hydrogen gas at the top of the compartment.

WARNING! Use insulated tools to reduce the chance of short-circuit when installing or working with the inverter, the batteries, or other equipments attached to this unit.

WARNING! For battery installation and maintenance, read the battery manufacture's installation and maintenance instructions prior to operating.

Personnel Precaution-

WARNING! Careful to reduce the risk or dropping a metal tool on the batteries. It could spark or short circuit the batteries and could cause an explosion.

WARNING! Remove personal metal items such as rings, bracelets, necklaces, and watches when working with batteries. Batteries can produce a short circuit current high enough to make metal melt, and could cause severe burns.

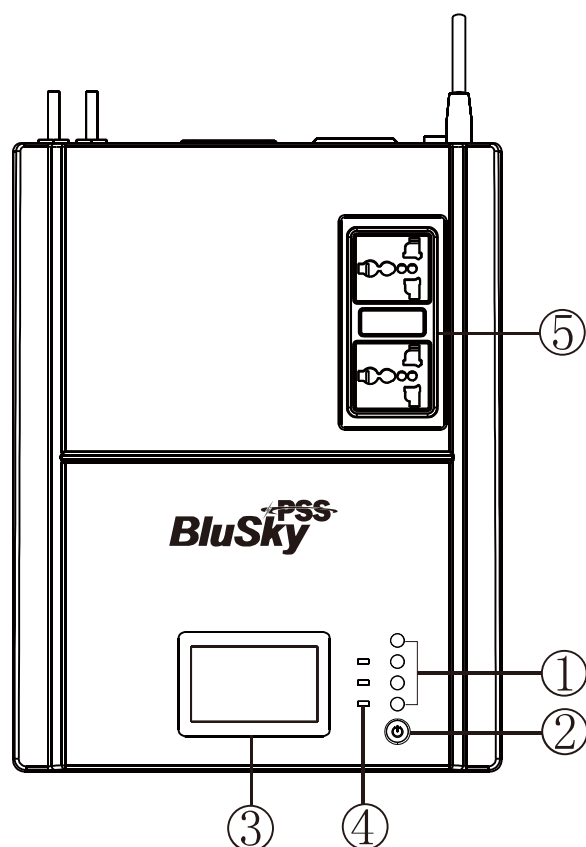
WARNING! Avoid touching eyes while working near batteries.

WARNING! Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.

WARNING! Never smoke or allow a spark or flame in vicinity of a battery.

3. Product Overview

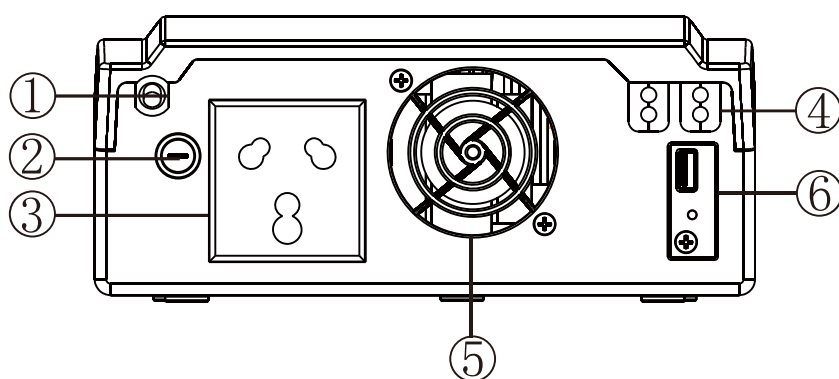
3.1 Top Panel



- ① Setting function button
- ② Power ON/OFF button
- ③ LCD
- ④ LED indicator
- ⑤ AC output receptacle

3.2 Rear Panel

- | | |
|------------------------|--------------------------|
| ① AC input | ④ Battery input wires |
| ② Input circuit fuse | ⑤ Cooling fan |
| ③ AC output receptacle | ⑥ USB charger for option |



4. Installation

NOTE: Before installation, please inspect the unit. Be sure that nothing inside the package is damaged.

4.1 Mounting the unit

The unit **ONLY** can be mounted vertically to a wall surface.

Please follow below steps:

1. Turn off the unit before mounting,
2. Select an appropriate mounting location. Use a horizontal line and the length of the line must be 172 mm and mark the two ends on the wall.(See Fig. 1)
3. Drill two marks by screws.
4. Mount the unit by positioning the key-hole slots over the mounting screws.

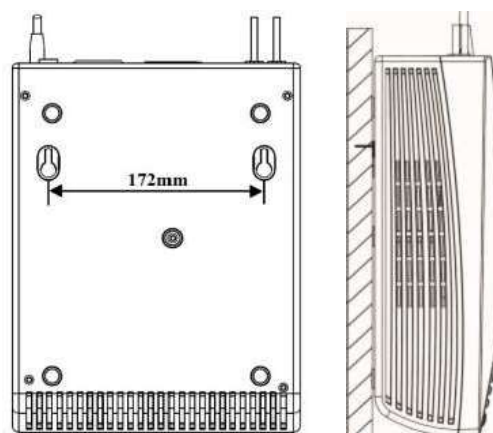


Fig. 1

4.2 Connect to Utility and Charge

Plug in the AC input cord to the wall outlet. The unit will automatically charge the connected external battery even though the unit is off.

Connect External Battery

Step 1- Take away the cover of external battery terminal.

Step 2- Following battery polarity guide printed near the battery terminal!

Place the external battery cable ring terminal over the battery terminal,

RED cable to the positive terminal (+);

BLACK cable to the negative terminal (-).

Step 3- Connect battery cables to the external batteries.

Note: For the user operation safety, we strongly recommend that you should use tapes to isolate the battery terminals before you start to operate the unit.

1) Single battery connection (Refer to Fig. 2): When using a single battery, its voltage must be equal to the Nominal DC Voltage of the unit (see below Table 1)

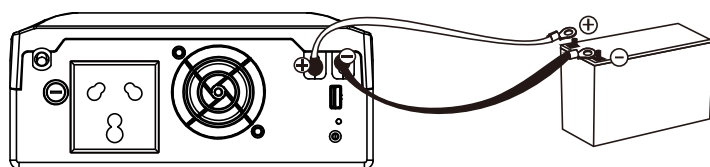
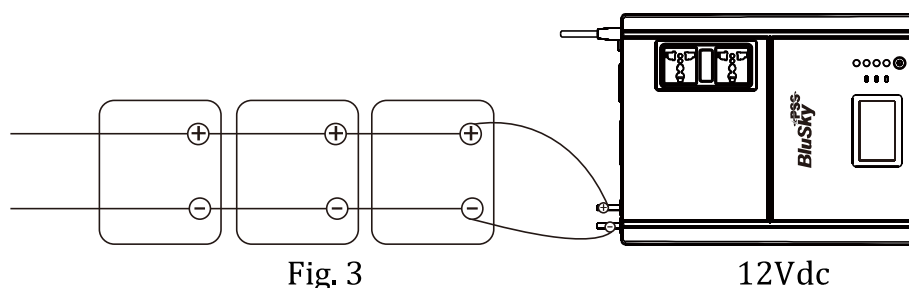


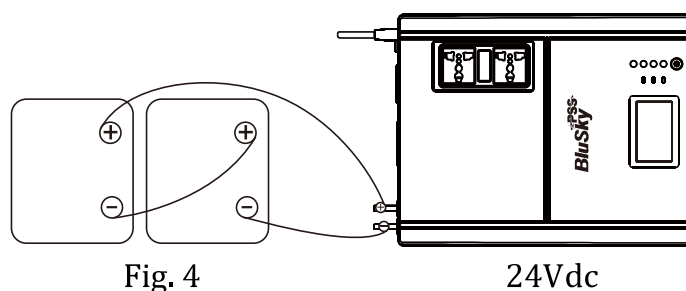
Fig. 2

Model	Nominal Battery Voltage
BSI103	12Vdc
BSI203	24Vdc

2) **Multiple batteries in parallel connection (Refer to Fig. 3):** Each battery's voltage must be equal to the Nominal DC Voltage of the unit.



3) **Multiple batteries in series connection (Refer to Fig. 4):** All batteries must be equal in voltage and amp hour capacity. The sum of their voltages must be equal to the nominal DC Voltage of the unit.



Step 4- Make sure to connect the polarity of battery side and the unit correctly.
Positive pole (Red) of battery to the positive terminal (+) of the unit.
Negative pole (Black) of battery to the negative terminal (-) of the unit

5. Operation

5.1 Power ON/OFF











Once the inverter has been properly installed, press the power switch to turn on the unit. The unit will work automatically in line mode or inverter mode according to input utility power's status. When press the power switch again, the unit will be turned off.






5.2 LED Indicators & Audible Alarms

There are three indicators (Green/ Yellow / Red) in the front panel of the unit.

	Indicator	Status	Alarm
Green LED	lighting	Line mode and battery fully charged	Off
	Flashing every 2 sec	Battery charging at power on	Off
	Flashing every 5 sec	Battery charging at power off	Off
	Flashing every 10 sec	Battery fully charged at power off	Off
Yellow LED	lighting	Battery mode	Off
	Flashing every 5 sec	Shutdown mode	Off
	Flashing every 1 sec	Battery weak at battery mode	Beep every sec
Red LED	lighting	Fault mode	Continuous beep
	Flashing every sec	The unit is overload	Beep every 0.5 sec
	Flashing every 5 sec	The unit is over charged	Continuous beep

5.3 LCD Display

Display	Function
Input source information	
	Indicates the AC input
	Indicate input voltage, input frequency, Battery voltage
Configuration Program and Fault Information	
	Indicates the setting programs, Fault Code.
Output Information	
	Indicate the output voltage, output frequency, Load percent, Load in VA, Load in W
Battery Information	
	Indicate the Battery level by 0~10%, 10%~30%, 30%~55%, 55%~80%, 80%~100% in battery mode, charging status in line mode
	Indicates the Battery voltage low.
<p>Battery mode:</p> <p>4 step: battery voltage $\geq 11.7V/23.4V$ the four bars are lighting.</p> <p>3 step: battery voltage $\geq 11.1V/22.2V$ the first three bars are lighting.</p> <p>2 step: battery voltage $\geq 10.6V/21.2V$ the first two bars are lighting.</p> <p>1 step: battery voltage $< 10.6V/21.2V$ the first bar is lighting.</p> <p>Line mode:</p> <p>4 step: CV mode, battery voltage $\geq 13.0V/26.0V$ the four bars are lighting.</p> <p>3 step: CC mode, battery voltage $\geq 14.0V/28.0V$ the first three bars are lighting, the fourth is flashing.</p> <p>2 step: CC mode, battery voltage $\geq 13.5V/27.0V$ the first two bars are lighting, the others are flashing.</p> <p>1 step: CC mode, battery voltage $\geq 13.0V/26.0V$ the first bar is lighting, the others are flashing.</p> <p>0 step: CC mode, battery voltage $< 13.0V/26.0V$ all led bars flashing.</p>	
Load Information	
	Indicates overload
	<p>4 step: $\geq 80\%$ load level.</p> <p>3 step: $\geq 55\%$ load level.</p> <p>2 step: $\geq 30\%$ load level.</p> <p>1 step: $\geq 10\%$ load level.</p>
Mode operation information	
	Line Mode
	Backup Mode





	Fault Mode
	Indicates unit connect to the mains
	Indicates the utility charger circuit is working
	Indicates the DC/AC inverter circuit is working
Mute operation	
	Indicates unit buzzer is disabled





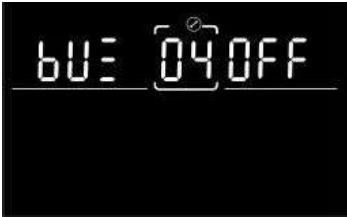


5.4 LCD Setting

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

If there is no button action during 60 seconds, setting mode will exit to normal display mode.


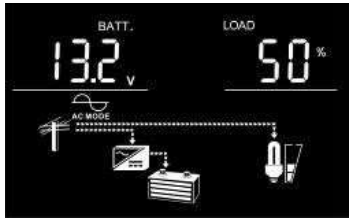


During shutdown process, the setting information can be stored in MCU, and it will be read out during next start up.



Program	Description	Selectable option	
00	AC input voltage range selection	 <p>Wide(<i>default</i>)</p> <p>If selected, acceptable AC input voltage range will be within 90~280Vac.</p>	 <p>Narrow</p> <p>If selected, acceptable AC input voltage range will be within 170~280Vac.</p>
01	AC charging current selection	 <p>20A (default)</p>	 <p>10A</p>

02	Low DC cut-off voltage setting	 <p>9.8V (default) 1000VA/900W model: setting range 8.7~12.0Vdc, 0.1V /time.</p>	 <p>19.6V(default) 2000VA/1600W model: setting range 17.5~24.0Vdc, 0.1V /time.</p>
03	AC output rating		
04	Buzzer mute control	 <p>ON (default)</p>	 <p>OFF</p>
05	Background LED control (for option)	 <p>ON (default)</p>	 <p>OFF</p>

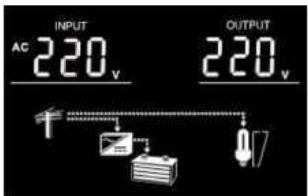


5.5 Display Setting

The LCD display information will be switched in turns by pressing "UP/DOWN" key. The selectable information is switched as below order: input voltage, output voltage, battery voltage, load percentage, load in VA, load in Watt, CPU Version, rated capacity.







Selectable information	LCD display	Selectable information	LCD display
AC input voltage / AC output voltage (Default Display Screen)		Load percentage	
Battery voltage		Load in VA	

CPU version / Rated capacity		Load in W	
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5.6 Operating Mode Description

Operation Mode	LCD Display	
Standby Mode	 <p>Charging by utility</p>	<p>Description: Utility input bypass to output, charger available</p> <p>Note:*Standby Mode: The inverter is not turned on yet but at this time, the inverter can charge battery with AC bypass output.</p>
Line Mode	 <p>Charging by utility</p>	<p>Description: The unit will provide output power from the mains. It will also charge the battery at line mode.</p>
Battery Mode	 <p>Power from battery only</p>	<p>Description: The unit will provide output power from battery.</p>



5.7 Fault Reference Code

Fault Code	Fault Event	Fault Code	Fault Event	Fault Code	Fault Event
00	 <p>Output voltage too high</p>	01	 <p>Battery overcharge</p>	02	 <p>Output short</p>
03	 <p>Over load after alarm</p>	04	 <p>Battery voltage too low</p>	05	 <p>Fan failure</p>

6. SPECIFICATION

MODEL		BSI103	BSI203
CAPACITY		1000VA/900W	2000VA/1600W
NOMINAL BATTERY VOLTAGE (lead-acid battery)		12Vdc	24Vdc
LINE MODE			
INPUT	Nominal Voltage	230Vac	
	Voltage Range	170~280Vac (Narrow Range)	
		90~280Vac (Wide Range)	
	Normal Frequency	50Hz or 60Hz	
OUTPUT	Voltage	230Vac	
	Frequency / Waveform	Following the Utility	
TRANSFER TIME		20ms Typical	
BACKUP MODE			
OUTPUT	Voltage	230Vac (±10%)	
	Frequency	50Hz or 60Hz (Auto detection)	
	Waveform	Simulated Sine Wave	
PROTECTION		Discharge, over-charged, over-loading, over-temperature, short-circuit protection	
BATTERY CHARGER (POWERED BY AC)			
CHARGING ALGORITHM		3-step charging	
AC CHARGING MODE		10A / 20A	10A / 20A
FLOATING CHARGGING VOLTAGE		13.75±0.25V	27.50±0.50V
OVERCHARGING VOLTAGE		15.30V	30.60V
GENERAL			
PHYSICAL	Dimension (D*W*H)	316mm(D)*227mm(W)*92mm(H)	
ENVIRONMENT	Operating Environment	0~50℃, 0%~90% relative humidity (non-condensing)	
	Storage Environment	-15℃ to 55℃, 0% to 90% humidity (non-condensing)	
	Noise Level	Less than 50dB	

7. TROUBLESHOOTING

Problem	LED/LCD/Buzzer	Possible Cause	Solution
Utility power is normal but the unit is in battery mode.	Yellow LED is lighting or  shing, Input voltage displayed as 0 on the LCD.	AC input Power cord is not connected well or Input protector is tripped	Check if AC wiring is connected well an AC protector is tripped.
Backup time is short.	Battery low alarm issue quickly.	Battery voltage is too low.	Charge the unit at least 8 hours.
		Battery capacity is not full even after charge the unit for at least 8 hours.	Check the date code of the battery. If the batteries are too old, replace the batteries.
No display on the front panel when the utility power is normal.	No LED/LCD display.	Battery is not connected well.	Check if the external battery cable and terminal are all correct.
		Battery defect.	Replace the batteries.
Buzzer beeps continuously and red LED is on.	Fault code 00	Output voltage too high	Return to repair center.
	Fault code 01	Battery overcharge	Return to repair center.
	Fault code 02	Output short / Over temperature	Check if wiring is connected well and remove abnormal load, and make sure the unit has adequate air  .
	Fault code 03	Over load after alarm	Disconnect non-critical loads.
	Fault code 04	Battery voltage too low	Return to repair center.
	Fault code 05	Fan failure	Replace the fan.

If there is any abnormal situations occur, which doesn't list above, please call the service people immediately for professional examine.

DISPOSAL

In the event the product reaches the end of its service life, please contact the local dealer for disposal instructions.



The product must not be disposed of with the household waste.

Disposal of the product at the end of its service life shall be done accordance with applicable disposal regulations for electronic waste.