

Inverter/Charger

BrightSun

Power Corporation

USER MANUAL



1012C 1512C 1524C 2012C 2024C 3024C 3048C
4024C 4048C 5024C 5048C 6024C 6048C

POWER INVERTER

Figures of Unit:

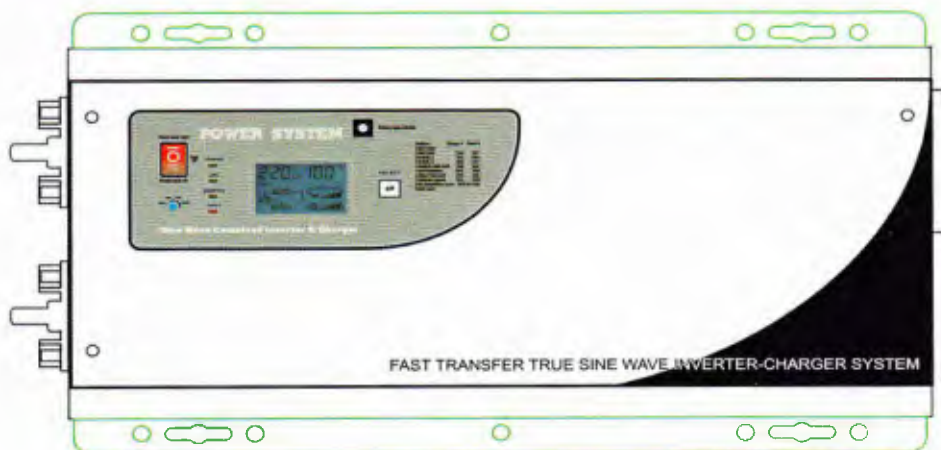


Figure 1 top view

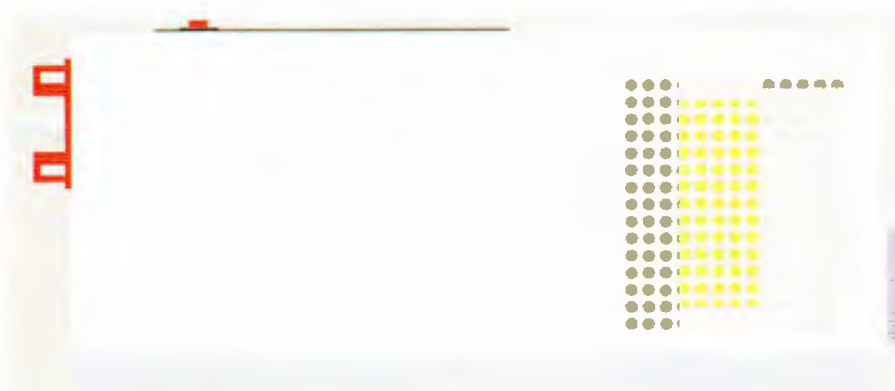


Figure 2 side



(RS232, Remote control & Optional)

Figure 3 DC side

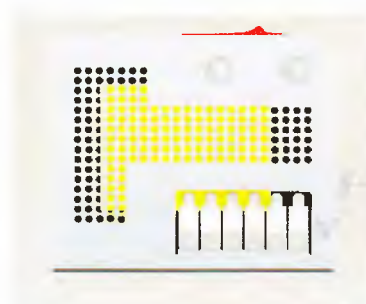
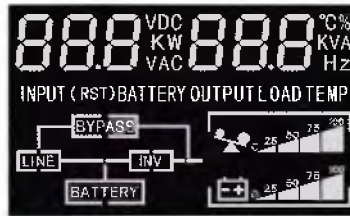


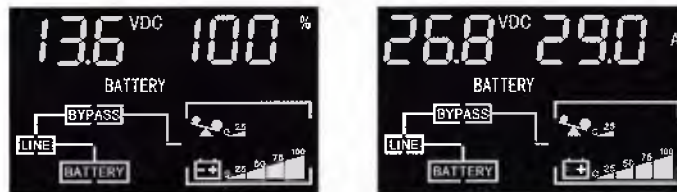
Figure 4 AC side

LCD Display



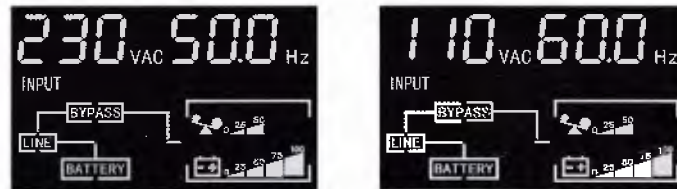
1) Charge Mode

When utility is on, LCD indicate charge current:



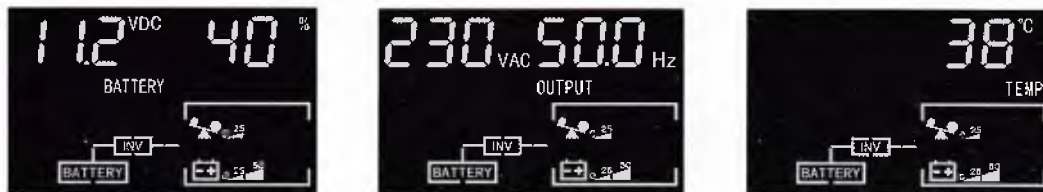
2) Utility Mode

On utility mode, the indication and displays are as following figures:



3) Battery Mode

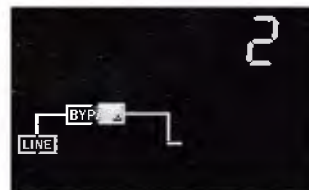
On battery mode, LCD indicate battery capacity:



4) Fault Mode

When inverter fault, the indication and displays are as following figures:

- 1: fan jam
- 2: overload
- 3/6/7: output short circuit
- 4: over temperature
- 8/9: battery overvoltage.



POWER INVERTER

MODEL	Model													
	1012C	1512C	1524C	2012C	2024C	3024C	3048C	4024C	4048C	5024C	5048C	6024C	6048C	
Line Mode Specifications:														
Input Voltage Waveform	Sinusoidal (utility or generator)													
Nominal Input Voltage	110Vac / 120Vac / 220Vac / 230Vac													
Low Line Disconnect	96Vac ±4% / 155Vac ±2%													
Low Line Re-connect	100Vac ±8% / 164Vac ±2%													
High Line Disconnect	132Vac ±4% / 272Vac ±2%													
High Line Re-connect	127Vac ±4% / 265Vac ±2%													
Max AC Input Voltage	140Vrms / 270Vrms													
Nominal Input Frequency	50Hz / 60Hz (Auto detection)													
Low Line Frequency Re-connect	44 ±0.3Hz for 50Hz;													
Low Line Frequency Disconnect	40 ±0.3Hz for 50Hz;													
High Line Frequency Re-connect	75 ±0.3Hz for 50Hz;													
High Line Frequency Disconnect	80 ±0.3Hz for 50Hz;													
Output Voltage Waveform	As same as Input Waveform													
Over-Load Protection (SMPS load)	Circuit breaker													
Output Short Circuit Protection	Circuit breaker													
Efficiency (Line Mode)	>95%													

POWER INVERTER

MODEL	Model													
	1012C	1512C	1524C	2012C	2024C	3024C	3048C	4024C	4048C	5024C	5048C	6024C	6048C	
Transfer Switch Rating	30A													
Transfer Time (Ac to Dc)	10ms (typical)													
Transfer Time (Dc to Ac)	10ms (typical)													
Pass through without Battery	Yes													
Max Bypass Overload Current	30A							40A						

POWER INVERTER

Inverter Mode Specifications:

MODEL	Model													
	1012C	1512C	1524C	2012C	2024C	3024C	3048C	4024C	4048C	5024C	5048C	6024C	6048C	
Output Voltage Waveform	Pure Sine wave													
Rated Output Power (VA)	1000	1500	2000	3000	4000	5000	6000							
Rated Output Power (W)	1000	1500	2000	3000	4000	5000	6000							
Power Factor	1.0													
Nominal Output Voltage (V)	110Vac / 120Vac / 220Vac / 230Vac $\pm 10\%$													
Nominal Output Frequency (Hz)	60Hz ± 0.3 Hz / 50Hz ± 0.3 Hz													
Auto tracking Main Frequency (Hz)	Yes (Following Main first connection) 50Hz @40-80Hz 60Hz @40-80Hz													
Output Voltage Regulation	$\pm 10\%$ rms													
Nominal Efficiency	$> 80\%$													
Over-Load Protection (SMPS load)	(110% < load < 125%) $\pm 10\%$: Fault (shutdown output) after 15 minutes; (125% < load < 150%) $\pm 10\%$: Fault (shutdown output) after 60s; Load > 150% $\pm 10\%$: Fault (shutdown output) after 20s													
Surge rating	3000VA	4500VA	6000VA	9000VA	12000VA	15000VA	18000VA							
Capable of starting electric motor	1 HP			2 HP				3 HP						
Output Short Circuit Protection	Current limit (Fault after 10s)													
Inverter Breaker Size	10A			30A										
Nominal DC Input Voltage	12V	12V	24V	12V	24V	24V	48V	24V	48V	24V	48V	24V	48V	
Min DC start voltage	11V/22V/43V													
Low Battery Alarm	10.5Vdc ± 0.3 Vdc for 12V battery 21.0Vdc ± 0.6 Vdc for 24V battery 42.0Vdc ± 0.6 Vdc for 48V battery													

POWER INVERTER

Low DC input Shut-down	10.0Vdc \pm 0.3Vdc for 12V battery 20.0vdc \pm 0.6Vdc for 24V battery 40.0Vdc \pm 0.6Vdc for 48V battery
High DC input Alarm & Fault	16Vdc \pm 0.3Vdc for 12V battery 32Vdc \pm 0.6Vdc for 24V battery 64Vdc \pm 0.6Vdc for 48V battery
High DC input Recovery	15.5Vdc \pm 0.3Vdc for 12V battery 31.0Vdc \pm 0.6Vdc for 24V battery 62.0Vdc \pm 0.6Vdc for 48V battery
Power saver	Load \leq 25W

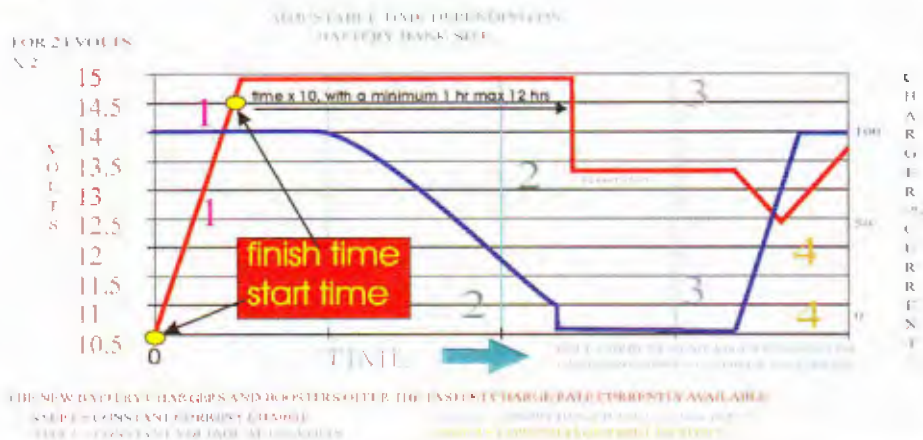
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Charge Mode Specifications:

MODEL	Model													
	1012C	1512C	1524C	2012C	2024C	3024C	3048C	4024C	4048C	5024C	5048C	6024C	6048C	
Nominal Input Voltage	110Vac/120Vac/220Vac/230Vac													
Input Voltage Range	96~132Vac/155~272Vac													
Nominal Output Voltage	Same as input voltage													
MAX Charge Current	35A	45A	25A	65A	35A	45A	30A	65A	35A	70A	40A	75A	50A	
Charge Current Regulation	Charge current adjustable: 25%, 50%, 75%, 100%. (Optional)													
Battery initial voltage	0-15.7Vdc/31.4Vdc/62.8Vdc(can operate with 0V battery)													
Charger Short Circuit Protection	Circuit breaker													
Breaker Size	30A							40A						
Over Charge Protection	Bat. V \geq 15.7Vdc / 31.4Vdc/62.8Vdc, beeps 0.5s every 1s & fault after 60s													
Charge Algorithm														
Algorithm	Three stage: Boost CC (constant current stage) → Boost CV (constant voltage stage) → Float (constant voltage stage)													

Charge Stage Transition Definitions

- ◆ **Boost CC Stage:** If A/C input is applied, the charger will run at full current in CC mode until the charger reaches the boost voltage.
- ◆ Software timer will measure the time from A/C start until the battery charger reaches 0.3V below the boost voltage, then take this time as T_0 and $T_0 \times 10 = T_1$.
- ◆ **Boost CV Stage:** Start a T_1 timer; the charger will keep the boost voltage in Boost CV mode until the T_1 timer has run out. Then drop the voltage down to the float voltage. The timer has a minimum time of 1 hour and a maximum time of 12 hours.
- ◆ **Float Stage:** In float mode, the voltage will stay at the float voltage.
- ◆ If the A/C is reconnected or the battery voltage drops below 12Vdc/24Vdc, the charger will reset the cycle above.
- ◆ If the charge maintains the float state for 10 days, the charger will reset the cycle.



Battery Type Setting


BATTERY TYPE SELECTION

Switch setting	Description	Boost			Float		
		Voltage			Voltage		
		12V	24V	48V	12V	24V	48V
0	To be used by factory for set up	-	-	-	-	-	-
1	Gel USA	14.0	28.0	56.0	13.7	27.4	54.84
2	AGM 1	14.1	28.2	56.4	13.4	26.8	53.6
3	AGM 2	14.6	29.2	58.4	13.7	27.4	54.8
4	Sealed lead acid	14.4	28.8	57.6	13.6	27.2	54.4
5	Gel EURO	14.4	28.8	57.6	13.8	27.6	55.2
6	Open lead acid	14.8	29.6	58.2	13.3	26.6	53.2
7	Calcium	15.1	30.2	60.4	13.6	27.2	54.4
8	De sulphation	15.5	31.0	62.0	4 hours then off		
9	Not used	-	-	-	-	-	-

POWER INVERTER

Front Panel



Switch	Power saver auto	Power on with saver mode (power saver $\leq 25W$)
	Unit Off	Power totally off (if there is AC power, inverter have charger function)
	Power saver off	Power on without saver mode
	Charge current adjustable: 25%, 50%, 75%, 100%. (Optional)	

Remark: Detail Remote control solution refers Appendix 2.

Audible Alarm

Battery Voltage Low	Inverter green LED Lighting, and the buzzer beep 0.5s every 5s.
Battery Voltage High	Inverter green LED Lighting, and the buzzer beep 0.5s every 1s, and Fault after 60s.
Inverter Mode Over-Load	110% < load < 125%, no audible alarm in 14 minutes, beeps 0.5s every 1s in 15 th minute, and Fault after 15 minutes. 125% < load < 150%, beeps 0.5s every 1s, and Fault after 60s. Load > 150%, beeps 0.5s every 1s, and Fault after 20s.
Over Temperature	Heat sink temp. $\geq 105^{\circ}C$, Over temp red LED Lighting, beeps 0.5s every 1s;

Remark: Detail Alarm setting refers Appendix 1.

Protection

Over Temperature Protection	Heat sink temp. $\geq 105^{\circ}C$, Fault (shutdown Output) after 30 seconds
Back-Feed Protection	Yes

Fault recovery By restart the machine

FAN Operation

Variable speed fan operation is required in invert and charge mode. This is to be implemented in such a way as to ensure high reliability and safe unit and component operating temperatures in an operating ambient temperature up to 50°C.

- Speed to be controlled in a smooth manner as a function of internal temperature and/or current.
- Fan should not start/stop suddenly.
- Fan should run at minimum speed needed to cool unit.
- Fan noise level target <60db.

The fan logic as below:

Condition	Enter condition	Leave condition	Speed
HEAT SINK TEMPERATURE	$T \leq 60^{\circ}\text{C}$	$T > 65^{\circ}\text{C}$	OFF
	$65^{\circ}\text{C} \leq T < 85^{\circ}\text{C}$	$T \leq 60^{\circ}\text{C}$ or $T \geq 85^{\circ}\text{C}$	50%
	$T > 85^{\circ}\text{C}$	$T \leq 80^{\circ}\text{C}$	100%
Charge Current	$I \leq 15\%$	$I \geq 20\%$	OFF
	$20\% < I \leq 50\% \text{Max}$	$I \leq 15\%$ or $I \geq 50\% \text{Max}$	50%
	$I > 50\% \text{Max}$	$I \leq 40\% \text{Max}$	100%
Load% (Invert mode)	Load < 30%	Load \geq 30%	OFF
	$30\% \leq \text{Load} < 50\%$	Load \leq 20% or Load \geq 50%	50%
	Load \geq 50%	Load \leq 40%	100%

Fan Operation

POWER INVERTER

General Specifications

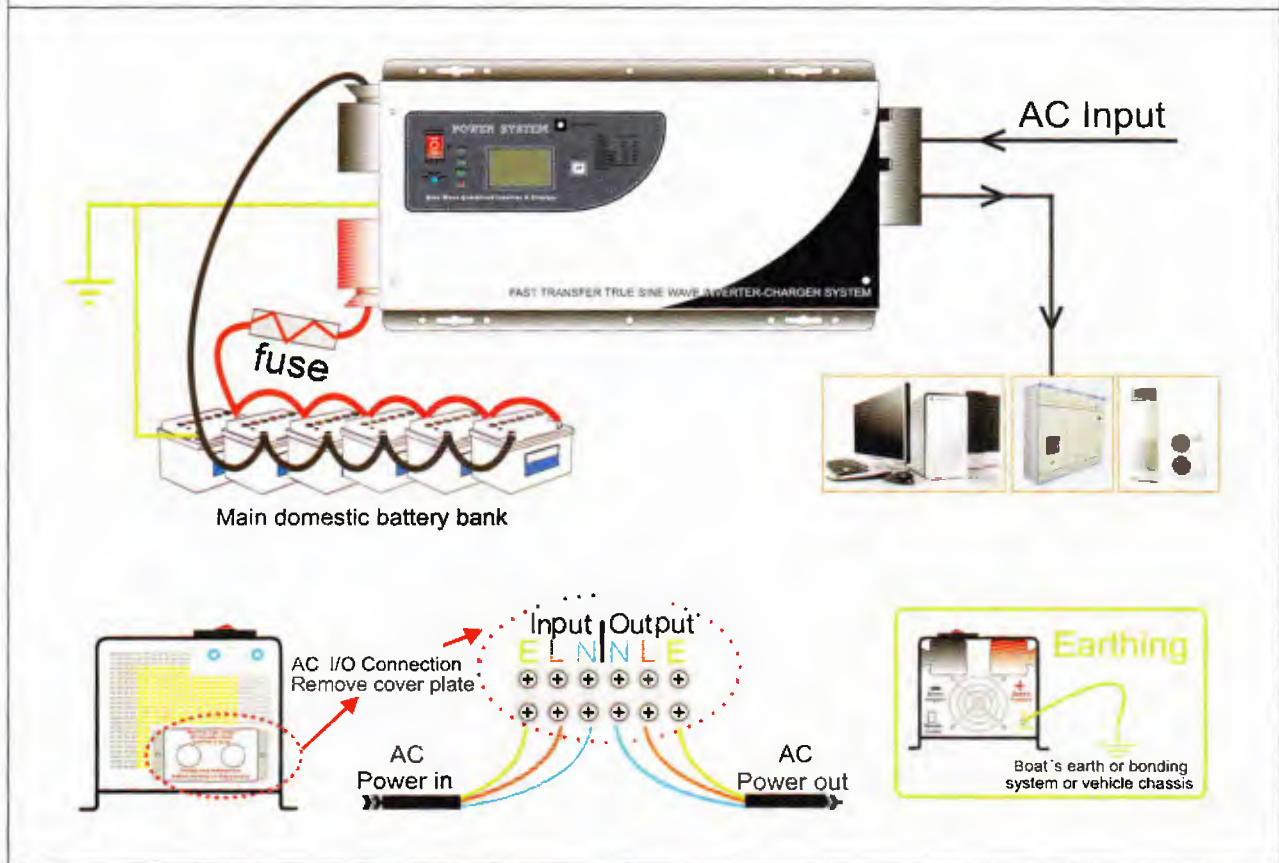
Safety Certification	CE(EN62040-1)
EMC Classification	EN62040-2, C2
Operating Temperature Range	0°C to 40°C
Storage temperature	-15°C ~ 60°C
Operation humidity	5% to 95%
Audible Noise	60dB max
Cooling	Forced air, variable speed fan
Size	1012C/1024C/2012C/2024C/2048C/3012C/3024C/3048C : 570mm*315mm*300mm 4024C/4048C/5024C/5048C/6024C/6048C: 755mm*319mm*288mm

AC Input wiring:

Selecting the proper wire (cable) size is very important for performance and safety. The Internal wire resistance varies according to amperage and temperature. It is recommended to keep voltage drop in all circuit under 3%. **Below table shows specific cable lengths for the input circuit.**

Inverter Model Watts Rating	Nominal Operating DC Voltage	Nominal Operating AC Voltage	AC Breaker size Minimum Wire Size
1012C	12Volts	120VAC	10 amps-12AWG
		230VAC	8 amps-12AWG
1512C	12Volts	120VAC	10 amps-12AWG
		230VAC	8 amps-12AWG
1524C	24Volts	120VAC	10 amps-12AWG
		230VAC	8 amps-12AWG
2012C	12Volts	120VAC	20 amps-10AWG
		230VAC	10 amps-12AWG
2024C	24Volts	120VAC	20 amps-10AWG
		230VAC	10 amps-12AWG
3024C	24Volts	120VAC	30 amps- 8AWG
		230VAC	15 amps-12AWG
3048C	48Volts	120VAC	30 amps- 8AWG
		230VAC	15 amps-12AWG
4024C	24Volts	120VAC	40 amps- 6AWG
		230VAC	20 amps-10AWG
4048C	48Volts	120VAC	40 amps- 6AWG
		230VAC	20 amps-10AWG
5048C	48Volts	230VAC	25 amps-10AWG
6048C	48Volts	230VAC	30 amps- 8AWG

Connection diagram



Installation Procedure:

1. Insure the DC voltage of inverter in accordance with the battery voltage .
2. Insure the positive pole (red) of inverter connect with the positive pole(red) of battery ,and the negative pole (black) of inverter connect with the negative pole (black) of battery ,then tighten the screw.
3. Turn on the inverter and see if it is good ,if good then turn off.
4. Connect with AC power/Ground wire ,turn on the inverter and see if it is working normally (charge the battery ,show charge current) ,if so, turn off the inverter.
5. Connect with the load/ground wire and turn on the inverter (Power saver auto or Power saver off) .
6. Turn on the Load .