



CSUNPOWER Photovoltaic Solutions

Global / high-tech / your safe choice Micro Grid

CSUNPOWER is a joint venture company formed by a union of prominent Chinese photovoltaic manufacturing entrepreneurs. The company focuses on global clean energy development, solutions, investment and financing, energy management and electricity distribution business. CSUNPOWER utilizes the strength in PV manufacturing, supply chain, and technology to form a highly reputable international energy solutions provider. CSUNPOWER has set up branches in United States, Japan, Philippines, Pakistan, Thailand, and the area of Middle East, forms a professional team to provide services to the local market, and realize the entrepreneurial strategy of "Globalized Partners, Local Professional Services". We devote ourselves to providing the best quality and efficient one-stop service for our global customers.

CSUNPOWER has a professional management team, adhering to the business philosophy of "efficient, professional, practical, and low-cost". We have many years of experience in the area of project development, design, engineering, research and development, project management, investment and financing, supply chain management, control, and project implementation & delivery, which we have received many compliments from our business partners.

1. Overview of the Micro Grid System

Micro-grid is an autonomous system which can realize self control, protection and management, can be connected with the external main grid operation, but also off-grid operation. The new energy configuration is flexible and can meet the different scenarios commercial requirements.

Commercial Typical Case		CSUNPOWER COF300KVA	CSUNPOWER CO100KVA	CSUNPOWER CO300KVA	CSUNPOWER CO500KVA	CSUNPOWER CO1000KVA
System Type		Without Grid	With Grid			
Solar System Peak Pow	er DC (KWp)	256	83	256	384	832
Daily Energy Productio (approx*)(kWh)	n	1050	350	1050	1600	3500
Number of 320W Poly Panels(Optional)	Solar	800	260	800	1200	2600
Roof Area Required (m	trs sq.)	3200	1040	3200	4800	10400
Capacity of generator	(KW)	300	100	300	500	1000
AC Output Max. (KVA	4)	300	100	300	500	1000
Battrey Bank		1650kWh/300kW	132kWh/100kW	396kWh/300kW	660kWh/500kW	1320kWh/1000 kW
Only battery duration v load(h)	vhen full	3.5	1	1	1	1
		Mai	in Components			
PV Module	CSUN 320O 72P	800	260	800	1200	2600
Mounting Structure	Hotdip Galvanized or Aluminium alloy	1	1	1	1	1
PV Cable(m)	1*4	2440	820	2440	3780	8200
DV Invortor	60KW	4		4	6	13
r v inverter	36KW		2			
	2V 2500Ah	330				
Lead-acid Battery	2V 200Ah		330			
(Li-ion and the battery	2V 600Ah			330		
capacity optional)	2V 1000Ah				330	
	2V 2000Ah					330
	100kW		1			
Battery Inverter	300kW	1		1		
	500kW				1	2
Battery Bracket	Set	1	1	1	1	1
Control System	Set	1	1	1	1	1
AC Output						
AC nominal voltage			230	V/400V		
AC grid frequency			50/60 Hz			
THDI	<3%					

Notes:

1,Installation materials needed for the solar systems depend on where & how will the equipments be mounted. Some extended materials will be prepared by the customers if needed.

2, Final Packing plan may change with different structure requirement, Provides data for reference only.3, The Average Daily Energy production is based on specific prod 4.1kWh/kWp/ day.

4,Battery discharging capacity will be different in different situation, such as discharging current, temperature and many others. Provides data for reference only.



Residential Typical Case		RES 3.6KVA	RES 4.6KVA	
System Type		With Grid		
Phase		Single	Single	
Solar System Peak Power D	C (KWp)	3.2	5.8	
Daily Energy Production (a)	pprox*)(kWh)	13	24	
Number of 320W Poly Sola	r Panels	10	18	
Roof Area Required (mtrs s	q.)	24	43	
AC Output Max. (KVA)		3	5	
Nominal DC Votage(V)		48	48	
Battrey Bank (Lead-acid)		4.8kWh/2kW	4.8kWh/2kW	
Only battery duration when full load(h)		2	2	
	Main Co	mponents		
PV Module	CSUN 320072P	10	18	
Mounting Structure	Hotdip Galvanized or	1	1	
Mounting Structure	Aluminium alloy		1	
PV Cable(m)	1*4	40	72	
Hadari d Lassantan	3.6KW	1		
Hybrid inverter	4.6KW		1	
Li-ion Battery (Lead-acid and the battery capacity optional)	48V 100Ah	1	1	
Battery Bracket	Set	1	1	
		AC Output	·	
AC nominal voltage	230V			
AC grid frequency		50 /60Hz		
THDI	<3%			

Notes:

1,Installation materials needed for the solar systems depend on where & how will the equipments be mounted.Some extended materials will be prepared by the customers if needed.

2,Final Packing plan may change with different structure requirement,Provides data for reference only.3, The Average Daily Energy production is based on specific prod 4.1kWh/kWp/ day

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2.Main equipments

2.1 Photovoltaic Modules

Our standard modules are designed, developed and manufactured for both residential and commercial, rooftop and

ground-mounted, as well as on-grid and off-grid photovoltaic projects. Quality of our products is the reason of CSUN's life. We select the best raw materials and conduct regular testing to ensure that they can meet our rigorous quality standards. Every module has been tested before delivery to make sure the efficiency tolerance is in a narrow range. Each link is strictly

controlled to ensure the benefit of our customers.

Features

- 72 High-Efficiency Polycrystalline Solar Cells;
- Passing mechanical load test of 5400Pa according to IEC 61215(advanced test);
- Tested to withstand hails with maximum diameter of 25mm with impact speed of 23m/s;
- The high-transparency low-iron tempered glass allows maximum light permeability while enhancing stiffness
- and impact resistance;
- Integrated bypass diodes to protect the solar cell circuit from hot spots during partial shadowing;
- Our module technology avoids any problems of water freezing and warping;
- Black back sheet or black frame is also available.

Electrical characteristics at Standard Test Conditions(STC)		Temperature Characteristics		
Module type	CSUN 320-72P	Voltage Temperature Coefficient	0. 2 92%/K	
Pmpp[W]	320	Current Temperature Coefficient	+0.045%/K	
VocM	45.0	Power Temperature Coefficient	0408%/K	
Isc [A]	9.17	Mechanical Characteristics		
VmppM	36.2	Dimension With Weight Frame	1640x990x40mm(LxWxH)	
Impp[A]	8.84	Weight	19.1kg	
Module efficiency	16.52%	Cell	6xl0 pieces polycystic line solar cells series strings (156mmxl56mm)	
Junction Box	with 6bypass diode	Back Sheet	White roughened safety glass, 3.2mm	

Standard Test Conditions(STQ irradiance 1000W/ m' AM 15;cell temperature 25 °C. Measuring uncertainty of power is within: 1:3%.

Dimensions







2.2Inverter

2.2.1 PV Inverter

The string inverters for feeding grid-connected photovoltaic systems are the one of the best choice for medium-sized

systems. Outstanding peak efficiency factors, patented technology and high-quality workmanship make them a reliable choice for permanently high system yields. This is ideally complemented by simple operation and comprehensive warranty and servicing options.

- > Maximum efficiency of 98.5% and wide input voltage range
- ➢ Internal DC switch
- Transformer less GT topology
- Compact design
- ➤ MTL String



Technical Data	36KW	60KW				
Input (DC)						
Max. PV input voltage	1000 V	1000 V				
Startup voltage	220 V	620 V				
MPP voltage range	200 - 950 V	570 - 950 V				
MPP voltage range for nominal power	500 - 800 V	570 - 850 V				
No. of MPPTs	3	1				
Max. number of PV strings per MPPT	3/3/2	14				
Max. PV input current	88 (33 A / 33 A / 22 A)	120 A				
Max. current for input connector	12 A	12 A				
	Output (AC)					
Nominal AC output power	36000 W	60000 W				
Max AC output power (PF=1)	36000 W	66000 W				
Max. AC output apparent power	36000 VA	66000 VA				
Max. AC output current	53 A	96 A				
Nominal AC voltage	3/N/PE 400 V	3 P + N + PE/3P + PE, 230 / 400				
	37N7TE, 400 V	Vac				
AC voltage range	352 - 440 V	310 - 480 Vac				
Nominal grid frequency	50 Hz / 60 Hz	50 Hz / 60 Hz				
Grid frequency range	45 - 55 Hz / 55 - 65 Hz	45 - 55 Hz / 55 - 65 Hz				
THD	< 3% (at nominal power)	< 3% (at nominal power)				
	> 0.99 @	> 0.99 @				
Power factor	default value at nominal power, (adj.	default value at nominal power, (adj.				
	0.8 leading - 0.8 lagging)	0.8 leading - 0.8 lagging)				
System Data						
efficiency	98.50%	98.70%				
Ingress protection rating	IP65	IP65				
Night power consumption	< 1 W	< 1 W				
Operating ambient temperature range	-25°C to 60℃ (> 50℃ derating)	-25°C to 60°C				
Allowable relative humidity range	0 - 100%	0 - 100%				

2.2.2 Hybrid Inverter

The bidirectional energy storage photovoltaic inverter can not only realize the function of off grid and grid connected generation, but also realize the bidirectional flow control of electric energy. The complete energy storage photovoltaic

system consists of the following components: PV array, ES series energy storage inverter, power grid, energy storage equipment, local load. The day of photovoltaic energy storage power through the photovoltaic inverter to provide local load or grid, also can be used to charge the storage equipment according to the needs of the night; storage equipment in the power grid can be released, in addition to the storage device through the inverter charging.



- > Maximum efficiency of 96.5% and wide input voltage range
- ➢ Internal DC switch
- Transformer less GT topology
- \succ Compact design
- MTL String

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Datasheet	3600ES	4600ES	
Input Data (DC)			
Max. DC power	3800W 5000W		
Max. DC voltage	550)V	
Start voltage	150V		
DC nominal voltage	360)V	
PV voltage range	100V-	580V	
MPP voltage range	125V-	530V	
Max. input current per string of tracker A/tracker B	11A/11A		
Number of independent MPP inputs	2	2	
Output Data (AC)			
Nominal AC output power	3600W	4600W	
Max. AC apparent power	3600VA	4600VA	
Max. output current	16 A 21A		
AC nominal voltage; range	220V/230V/240V		
AC grid frequency; range	50,60Hz;±5 Hz		
Power factor at rate power	100.00%		
Power factor 0.8leading0.8lag		.0.8lagging	
THDi	<3%		
AC connection	Single phase		
Battery			
Battery type	Lead-acid or Li-ion		
Norminal voltage	51.2V		

Max. discharging /charging power	2500W	2500W / 2500W	
Charging curve	3-stage adaptive	3-stage adaptive with maintenance	
Operating voltage range	46V-	-57V	
Max. charging/discharging current	50A /	/ 50A	
Backup Output			
Output rate power	2000	2000VA	
Peak power	3000V	3000VA,10s	
Output voltage	230V±2%, Optional)±0.2%,TH	50Hz (60Hz Dv<3%(linear load)	
Eciency			
Max. eciency	97.00%	97.10%	
Euro - eta	96.50%	96.50%	
MPPT eciency	99.50%	99.50%	
Protection Devices			
DC reverse polarity protection	Y	es	
DC switch rating for each MPPT	Yes		
Output over current protection	Yes		
Output overvoltage protection-varistor Yes		es	
Ground fault monitoring	Y	Yes	
Grid monitoring	Yes		
Integrated all - pole sensitive leakage current	Y	Yes	
monitoring unit			
Display		CD	
Interfaces: Wi-Fi/GPRS/RS485	Yes/O	Yes/Opt/Opt	

2.2.3PCS

Power Convert System main function is to realize the bidirectional flow of AC and DC energy in the form of charging and discharging. The main application is micro grid system ,large scale energy storage system in smart grid, island or remote area without grid. When it is applied to microgrid system ,PCS can work in two modes of grid and off grid.

Specification		Model No.					
Rating Power(KW)		50 100 300 500					
Rating Current(A)		76	76 152 460				
Rating Frequency(Hz)			5	0			
Frequency Range(Hz)		45-55					
RatingVoltage(V)	Grid Operation	380					
Voltage Range(V)	Parameters		380±10%				
AC voltage accuracy			± 5%				
Output Waveform			THD	< 3%			
Power Factor		≥0.99					
RatingVoltage(V)		380					
Rating Frequency(Hz)		50					
AC voltage accuracy		± 3%					
Frequency accuracy	Off-Grid Operation Parameters	± 2%					
Output Waveform		THD < 3%					
Voltage variation range		<10%					
Frequency variation range		<2%					
Phase		Three-phase four wire					
Overload Capacity		110%(10 min)					
Discharging efficiency		98.10%					
Charging efficiency	Total Parameters	97.10%					
Communication Port		RS485/Ethernet/ Modbus protocol					
Cooling mode		Forced air cooling					
Installation		In-door installation					



2.3 Control System

The microgrid central controller is the core of the stable operation of micro grid, mainly to solve the micro real-time control network and stable operation, meet the system voltage and frequency stability, coordinating the operation of micro power, emergency power support, complete and fast switching off network, maintain power balance and coordination control of micro grid.

The widly applied is control system will according to the schedule arrangement, combined with the new energy output, making the total output power curve reasonable, by quickly switch the energy storage system of charge and discharge power and discharge state of the real-time adjustment of the total power of renewable energy and storage system output load plan.



Control system mainly to achieve the following functions:

- Emergency Frequency Regulation.
- Dynamic Voltage Regulation.
- Islanding Detection.
- Smooth Distributed Power Fluctuation.
- Generation Scheduling Curve.
- Peak Shaving and Valley Filling.



2.4 CSUNPOWER Mounting Structure

One of the most important features of mounting system is the duration under different weather conditions. Structure must be solid and reliable, able to withstand atmospheric erosion, wind loads and other external effects, safe and reliable installation, with minimal installation achieve the maximum effect of the use, almost maintenance-free surface, and reliable maintenance, these are to do a program selection the important factor to consider. System-based solution makes the installation of that devices become commercially possible, in order to achieve the best result.

- · Designed for crystalline module installation.
- · Anti-leakage design.
- · Water chute on the aluminum rail.
- · EPDM sealing rubber between modules, etc.
- · Easy Installation.
- · Aesthetical appeal.





· Widely used for both crystalline and thin film modules.

· Easy & quick installation.

 Only 4~5 kinds of components and no more than three kinds of tools in whole system fixation.

 \cdot All system components are made with high quality aluminum & stainless steel.

· Adoptable to all kinds of crystalline modules and certain thin film modules.

• Direct foundation bolt, concrete base or bear load are the possible solution for ground installation.

System installation inclination is adjustable according to requirement.

 $\cdot \mbox{ Easy installation, only three kinds of tools could finish the installation.}$





2.5 Battery Bank

2.5.1 Lead-acid battery

Based on strong scientific and technical strength. Four types of energy storage batteries have been developed in accordance with the application characteristics of solar energy, wind energy, hydropower energy storage and wind & solar hybrid project, and the four types of batteries meet the requirement of BSEN61427-2002 standard via testing and verification. Moreover, they have unique characteristics:

Longer designed life (tubular plate battery: 20 years, flat plate battery: 15 years);

The daily or seasonal deep cycle and shallow cycle are excellent;

Superior low current discharge performance

Better high temperature performance

Stronger constant power discharge capability

Better charge acceptability

Wider temperature range

Better safety performance and reliability

High Performance/price ratio and low yearly operating cost

Eco-friendly, energy-saving

Model selection characteristic:

Economical, procurement and maintenance cost are low;

Situation that cell battery voltage is 2V, capacity is below 3000Ah;

Strong current in short time is relatively more excellent;

the floor area of installation is smaller;

Cycle performance is excellent;

Refer to the previous page for other characteristics;

Electrolyte: primary material adopts Germany gas silicon dioxide, and special technology is adopted; the material will be the thin colossal state when it's injected initially, and the material will be gel state in finished battery, accordingly, leakage and lamination are avoided.

Plate: both positive plate and negative plate adopt pasted plate, the distance is shorter, the strong current discharging capability is strong; the grid is composed of multi-component alloy whose hydrogen evolution potential is higher, the corrosion resistance is fine and service life is long; the utilization rate of active substance is high and charge receptivity is strong.

Battery case lid: made of ABS material, corrosion is prevented, strength is high and appearance is beautiful. The case lid is sealed by hot-melting, reliability is high and potential leakage risk can be prevented.

Separator: adopt special micro-pore PVC-SiO2 separator from Europe AMER-SIL Company, the porosity of separator is big and resistance is low. It has bigger electrolyte storage space.

Terminal sealing: the built-in copper core lead-base terminal post has stronger current carrying capacity and corrosion resistance. The unique double sealing structure of terminal post can effectively avoid leakage, to guarantee reliability of terminal post sealing.

Safety valve: adopt Germany technology, with constant opening and closing valve, high reliability, the accumulator case expansion, damage and electrolyte dry up can be avoided.

1. 元法保证书



2.5.2 Li-ion battery

Lithium battery is characterized by high specific energy, Discharge voltage stability, Wide operating temperature range, Low self

discharge rate,Long storage life,No memory effect and no pollution,Diversified products structure,Provide one-stop solutions for various applications,and have long life cycle,high density energy and high cost performance,High rate discharge superior performance,Low self discharge,no memory,Safe and eco-friendly.

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Datasheet				
Voltage	51.2Vdc			
capacity	100Ah			
energy	5.0kWh			
Warranty	5年			
Size (width x high x thick)	710x610x120mm			
weight	74.5kg			
Basic parameters				
Life (25 C)	12 年			
Life (40 C)	10 年			
Cycle times (80% DOD, 25 C)	> 4000			
Maintain	Warranty free			
Storage time (-25 C~35 C)	Charge for six months			
working temperature	-20 °C~55 °C			
Storage temperature	-30 °C~60 °C			
Transport specification	UN 38.3			
EMC Standards	IEC 61000			
Electrical parameters				
working voltage	46.4~57.6 Vdc			
Maximum charging voltage	57 Vdc			
Maximum charge current	50 A			
Maximum discharge current	50 A			
Communication parameters				
communication interface	RS485			
Communication protocol	MODBUS			



All cables from PV modules to inverter have been designed to minimize losses and ensure optimal operation even at high temperatures. These cables are extremely robust and resist high mechanical load and abrasion. High temperature resistance and excellent weather proofing characteristics provide a long service life.



- > Multiple plugging and unplugging cycles.
- Highly robustness, UV-Resistance.
- Connector adopts insertion of reed with inner-knob type.

- > Auto-lock equipment for male and female points enables connection easier and reliable.
- > Popular appearance suit most of field installation.
- Simple on-site operation.
- > Fit for PV cables with different insulation diameters.
- High current carrying capacity

PV Cable Technical data			MC4 Connect	ors Technical data
Nominal Voltage	UO/U-600/1000AC.1800DC		Insulation material	PPO
Test Voltage	6500V5min 50HZ		Color	Black
Conductor DC Resistance	at 20°C≤0.795Ω/Km		Contact material	Copper tin plated
Temp. rating	-40°C ~ +125°C		Rate voltage	DC 1500V(TUV)600V(UL)
Max.Conductor Temp	+120°C		Rated current	30A
Ambient Temp	.(-40°C ~ +90°C): > 25years		Safety class	class 2
Bending radius	≥ 8* cable OD		Waterproof grade	IP 68
Fire performance	IEC60332-1 TUV 3PFG 1169/08: 2007		Temperature range	-40 ~+90 Celsius degree
UV Resistant	≥ 720h		Flame retardant grade	UL94-V0
Content of halogen acid gas	IEC670754-1 EN50267-2-1		Pin dimensions	Φ4mm
Smoke density	IEC61034 EN50268-2		Test voltage	6kv(TUV50HZ 1min)
			Contact resistance	0.4 mΩ



2.7 Monitoring System

CSUNPOWER Monitoring system includes the LCD monitor, Its large display shows the current power, total energy production, current, voltage, current status and historical information, operating information, if necessary, can set parameters by LCD.

We can also provide our customers with a flexible internet monitoring solution which is suitable for residential, commercial rooftop systems and PV power plants. System monitoring device is user-friendly and reliable. It can archive all-weather data and automatically transmit data to our global PV monitoring web-server via internet. Our customers can login monitoring website or use smart phone Apps to check power plant information.





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