

The Design for A 99KWp Off-grid, Ground-mounted Solar Power System

(99KW 光伏地面安装系统设计和报价)

(1) **Similar Project Pictures** (类似离网系统的图片) :



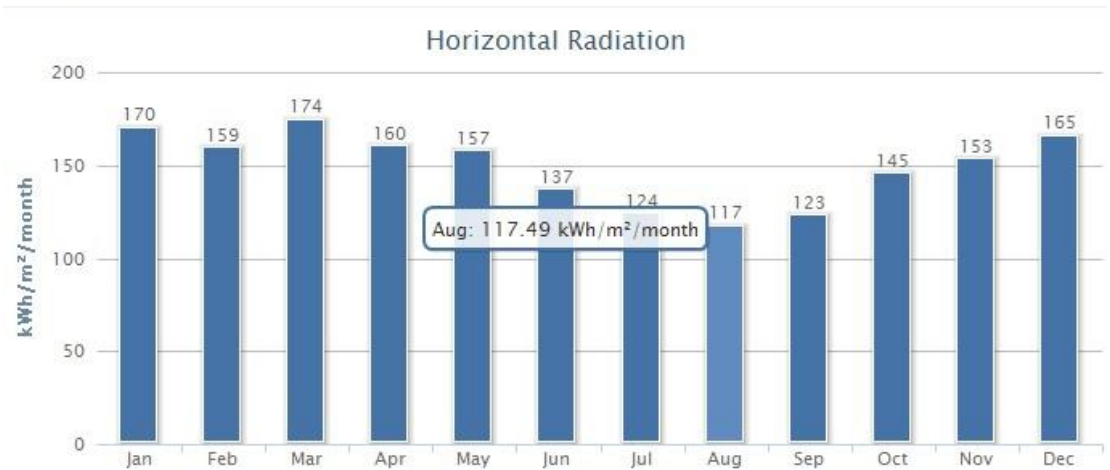
(2) The Basic Information of The Intended System Site（系统安装地的基本地理和气象信息）:

The system intended site is located in the city of Abeokuta, Nigeria, with Latitude: 7.16083° N, Longitude: 3.34833° E.



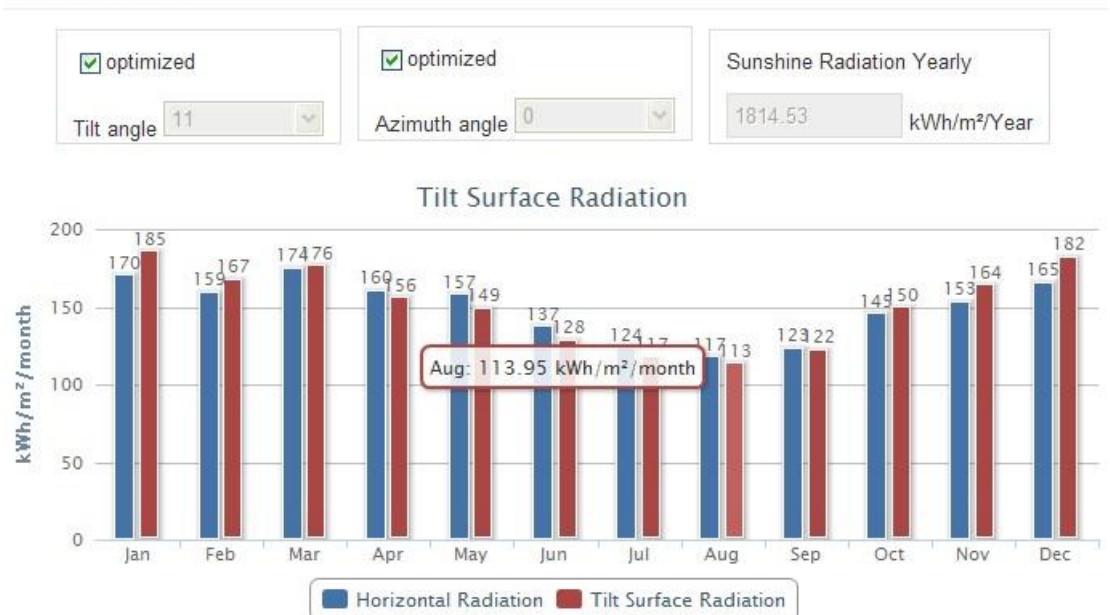
地表水平面的月平均太阳能辐照数据:

Horizontal Radiation



最佳倾斜安装角度下的月平均太阳能辐照数据:

Tilted Surface Radiation



(3) The Setting Conditions for System Designing:

(系统设计的一些前提设定条件):

(1) The Tilt Angle for Mounting Solar Array Rack(太阳能电池方阵的安装最佳倾角):

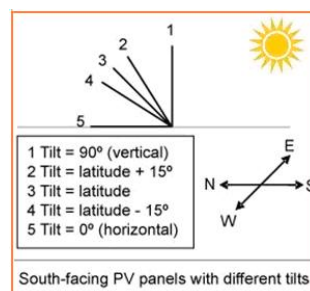
As the right diagram illustrates, we here adopt a tilt angle 11° for the intended solar array mounting rack, which is the optimized tilt angle.

(2) The Azimuth Angle for Mounting Solar Module (太阳能电池方阵的安装方位角):

As the right diagram illustrates, we here adopt an angle -20° (South→East) for the intended solar modules.

(3) Local PSH (Peak Sun Hours) Per Day in critical month of Aug. is (系统设计关键月-8月份的日均有效峰值日照时间):

3.79kwh/m²/day



(4) The Intended System Main Components(拟采用的系统主要部件):

① The Intended Poly-si Solar Module (250Wp) (拟采用的乐能公司多晶硅 250W 组件参数):

Electrical Characteristics					
STC	LNSE-250P	LNSE-245P	LNSE-240P	LNSE-235P	LNSE-230P
Optimum Operating Voltage (Vmp)	30.5 V	29.6V	29.4V	29.8V	29.6V
Optimum Operating Current (Imp)	8.04A	8.11A	8.00A	7.72A	7.79A
Open Circuit Voltage (Voc)	37.3V	37.0V	36.8V	36.6V	36.5V
Short Circuit Current (IsC)	8.52A	8.46A	8.42A	8.25A	8.15A
Maximum Power at STC (Pmax)	245W	240W	235W	230W	225W
Module Efficiency	15.1%	14.9%	14.8%	14.4%	14.0%
Operating Module Temperature	-40 °C to +85 °C				
Maximum System Voltage	1000 VDC (IEC) / 600V DC (UL)				
Maximum Series Fuse Rating	10 A				
Power Tolerance	0/+5 %				
STC: Irradiance 1000 W/m2, module temperature 25 °C, AM=1.5; Best in Class AAA solar simulator (IEC 60904-9) used, power measurement uncertainty is within +/- 3%					
NOCT	LNSE-250P	LNSE-245P	LNSE-240P	LNSE-235P	LNSE-230P
Maximum Power at NOCT (Pmax)	180W	176W	172W	168W	165W
Optimum Operating Voltage (Vmp)	27.8V	26.9V	26.7V	27.1V	26.9V
Optimum Operating Current (Imp)	6.46A	6.54A	6.44A	6.20A	6.12A
Open Circuit Voltage (Voc)	34.3V	33.9V	33.7V	33.9V	33.8V
Short Circuit Current (IsC)	6.89A	6.84A	6.80A	6.68A	6.65A
NOCT: Irradiance 800 W/m2, ambient temperature 20 °C, AM=1.5, wind speed 1 m/s; Best in Class AAA solar simulator (IEC 60904-9) used, power measurement uncertainty is within +/- 3%					

Packing Configuration

Container	20' GP	40' GP
Pieces per pallet	25	25
Pallets per container	12	28
Pieces per container	300	700



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LUXEN designs, manufactures and delivers high-quality solar panel 1W - 300W, for both on-grid and off-grid systems. OEM/ODM services also can be offered by providing customized design and best cost-effective / proven-performance solar products.

The ISO 9001 management system and a comprehensive range of tests and quality control procedures established according to IEC 61215 / 61730 requisites are implemented in LUXEN's manufacturing facilities, only for one goal: We deliver RELIABLE solar products.

Note : There are total 396 pieces of the intended solar module will be wired in the system, in 36-in-parallel and 11-in-series wiring, w/ total rated power of 99KWp.

总计 396 块该型组件以 36 并 11 串的电气排列方式构成一个峰值功率为 99KW 的光伏阵列。

② Off-Grid 3-Phase Inverter（拟采用的离网三相太阳能逆变器参数）：

Technical DataModel		TI22030KN3P	
DC Input			
Nominal Voltage (V _{DC})	220		
Rated Current (A)	136.5		
Permissible Voltage Range (V _{DC})	190.0~300.0		
Undervoltage Protection (V _{DC})	195.0		
Undervoltage Return (V _{DC})	235.0		
Overvoltage Protection (V _{DC})	295.0		
Overvoltage Return (V _{DC})	275.0		
AC Output			
Rated Power (KW)		30.0	
Rated Voltage and Frequency		380VAC、50HZ（3 phases, 4 lines）	
Rated Current(A)		45.6	
Output Voltage Range		380VAC±3%	
Output Frequency Range		50HZ±0.05	
(Output Wave) Total Harmonic Distortion（THD）		≤4%（Linear Load）	
Dynamic Response（Load 0~100%）		5%，≤50ms	
Power Factor（PF）		0.8	
Inverter Efficiency （80% Resistive Load）		≥90%	
Dielectric Strength（Input and Output）		1500VAC，1 分钟	
3-Phases Unbanlance Capacity		≤20%	
Overload Capacity		120%，60s / 150%，10s	
Communication and Protection			
RS485 / RS232		RS485（A/D+、B/D-） / RS232（RX、TX、GND）	
Protection Function		inverse polarity of battery and solar panel; backfed Charge;Overheating; Output Overload and Short Circuit; etc.	
Short Circuit Protection		Can not auto-resetting, need to be return by manual work;	
Mechanical Size and Ambient Temperature			
Protection Degree		IP20	
Elevation (m)		≤3000	
Ambient Temperature (°C)		-20~+65	
Noise（1m）		≤60dB	
Vertical:（D x W x H mm）		650 x 800 x 2260	

③ The Intended PV Source Circuit Combiner (拟采用的光伏组件串源电流的汇流箱的参数):

PV Array Input	
Input Voltage Range (VDC)	200VDC~1000VDC
Permissible Input Route (N)	9
Single PV string Max. Current (A)	10
Communication and Protection	
Remote Monitor	RS485
Output Control	High Voltage Circuit Breaker
Protection Function	Preventing Backfed Array Current; High voltage lightning Countering; Overcurrent Protection; Overheating Protection;
Mechanical Size and Ambient Temperature	
Size (D x W x H)	300 x 400 x 160
Reference Weight (Kg)	18
Protection Degree	IP65
Elevation (m)	≤3000
Ambient Temperature (°C)	-20 ~ +65

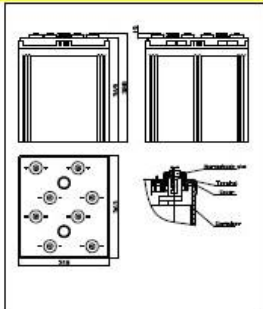
④ The Intended Solar Charge Controller (拟采用的太阳能充电控制器的参数):

Model	TS220V/400A
Rated Current Range	400A
Battery Input	
Nominal Input DC Voltage (V _{DC})	220
Undervoltage Protection (V _{DC})	≤99.0
Undervoltage Return (V _{DC})	≥115.0
Overvoltage Protection (V _{DC})	≥150.0
Overvoltage Return (V _{DC})	≤142.0
PV Source String Input	
Max.Open Circuit Voltage (V _{DC})	230.0
Max. Charging Current (A)	400
Permissible Input Route (N)	12
Floating-Charge Voltage (V _{DC})	125.0
Overcharge Voltage Protection (V _{DC})	≥132.0
Overcharge Return Voltage (V _{DC})	≤121.0
DC Output	
Max. Output Current (A)	400
Overload Capacity	120% Overload Shunt in 60s / 150% Overload Shunt in 10s
Protection Functions	Battery Overcharge and Overdischarge; Inverse Polarity of Battery and Solar Panel; Backfed Charge; Overheating; Output Overload and Short Circuit; etc.
Communication Interface	RS485 (A、B)
Mechanical Size and Ambient Temperature	

Size (Depth x Width x Height)	650 x 800 x 2260
Reference Weight (Kg)	50
Protection Degree	IP41
Elevation (m)	≤3000
Ambient Temperature	-20 ~ +65

⑤ The Intended Deep-cycled Battery for Solar Electricity Storage（拟采用的太阳能储能蓄电池的参数）：

Type	Rated Voltage (V)	Rated capacity				Dimension(mm)				Weight (Kg)
		C ₂₀ V _t =1.80V/cell	C ₁₀ V _t =1.80V/cell	C ₅ V _t =1.8V/cell	C ₁ V _t =1.75V/cell	L	W	H	Total Height	
GFM-2000	2	2000	1600	1500	1100	318	363	369	388	100

		Valve-regulated Lead Acid Batteries GFM series are widely utilized as standby power supply for communication and signal systems such as telecommunication, mobile station, railway and vessels etc., for the energy storage system of solar and wind power generation, and for the backup power supply of UPS and emergency illumination. Their designed life for standby usage is 10 years

Normal Voltage	2V	Attain certificate: ISO9001(03006Q10084R1M) ISO14001(03004E1009R0M) ISO18001(03004E1009R0M) Underwriters Laboratories Inc.(MH28466) Russia telecom Conforms to the standard: GB/T 19638.2-2005 YD/T799-2002 JISC8704-2:1999 IEC60896-2:2004
Capacity	2000 Ah @ 20hr to 1.80V per cell @ 25°C (77°F)	
Weight	Approx. 100 kg (220 lbs)	
Internal Resistance (full charged)	Approx. 0.20mΩ @ 25°C (77°F)	
Maximum Discharge Current	9900A (5sec)	
Self Discharge @ 25°C (77°F)	No more than 3 % after 30 days storage	
Operating Temperature Range	Discharge: -40°C ~ 50°C (-40°F ~ 122°F) Charge: -20°C ~ 45°C (-4°F ~ 113°F) Storage: -20°C ~ 40°C (-4°F ~ 104°F)	
Recommended Operating Temperature	15°C ~ 25°C (59°F ~ 77°F)	
Maximum Charging Current Limited	160A	
Charging Voltage @ 25°C (77°F)	Float: 2.23 V, Temps coefficient -3 mV/°C Cycle: 2.30 V	
Contain Materials	ABS	
Terminal	M8 and HPb59-1	
Capacity Affected by Temperature	105 % @ 40°C 85 % @ 0°C 60 % @ -20°C	

⑥ DC Power Distribution Unit（拟采用的直流配电单元）：



⑦ AC 3-Phases Power Distribution Unit (拟采用的交流 3 相配电单元)：



⑧ Solar Array Mounting System (拟采用的太阳能电池阵列支架)：



GroundA is well suited for flat-roof and open-ground of large power plants. All PV arrays are able to bear more wind load as an enhanced unit. The system, when applied on commercial buildings, will prevent damage to the waterproof layer of the roof.

Install site	Flat-roof & Open-ground
Tilt angle	30° or As customer Required
Max wind Speed	1.2KN/m
Snow load	1.0KN/m
Standard	AS1170.2/EUROCodes
Material	Galvanized steel
Warranty	10 Years

(5) System Components List and Its Price Quotation:

（系统构成详细配置和报价）：

Components	Model / Specification	Qty.
Solar Module	LNSE-245P	396
Module Racks	Ground A	18
PV Array Combiner	For combining 10 strings	4
Solar Charge Regulator	400A/DC220V	1
Solar Battery	GFM-2000, w/ wiring cables and connectors	110
Battery Rack	suitable for safe installation	5
Off-grid Inverter	TI22030KN3P	1
AC/DC Power Distribution Cabinet	Suit with the system	1
Wiring Connectors for PV Strings	MC4	50pairs
PV Cable	4 mm ²	1,200m
Common Cable	Suitable for electric PVC conduit wiring, single core, copper material w/ 25 mm ² wire size	200m
System Grounding Wire	2.5 mm ² nude copper wire	500m
Installation Service Fee (2 staffs of our company sent for installation-guide)		CNY50,000.00
Final Quotation Price (FOB Shanghai)		CNY1,267,892.00