Residential Solar

Good for the environment
Great for your bottom line.

Residential solar systems
from PAKSOLAR

ww w. paksolarservices.com

PAKSOLAR
RENEWABLE ENERGY

PAKSOLAR are leaders in solar technology. We can design a system to meet your usage profile and your budget.

Why residential solar?

There are many benefits that come with the installation of a solar power system, including:

A hedge against the risk of rising electricity load-shedding

After 22 years of electricity shortfall generally in line with demand increases, average Pakistan electricity demand have increased by 20% to 40% within five years. In July, 2016 power demand 21,700 MW but power generated 1,300 MW, Pakistan record deficit is 8,700 MW. Rural area load-shedding 14 hours, Urban area 10 hours, some industrial & commercial area load-shedding 13 hours, expected per unit price Rs.12 to Rs.40.

A/c to the Energy Planning Expert group of CPEC;
Shortfall to further rise = 9,200 to 10,844 MW in 2020
Only 2.25 to 5KW Solar Power plant can be resolve your load-shedding problem.

Low risk, secure investment

Residential PV systems plants attract typical paybacks of 3-7 years, and a (ROI) return on investment in excess of 17%. The expected life of a solar power system is over 20 years, which ensures that will continue to generate electricity well after the initial investment has been paid back.

For Off-Grid system after every 2 to 2.5 years battery replacement running cost involve which will be return within a year or two.

Systems are custom designed for your facility

Our solar power system proposal is custom designed for your facility, taking into considerations such as current electricity usage, existing electrical infrastructure, roof structure and area, and potential roof shading.

Increases property value through lower overhead costs

A residential solar system will reduce the electricity overhead cost of the home, which is a significant overhead expense for most houses. This will make the house more appealing to sale up to Rs.1.2 million aginst investment only on solar 0.5 million.

Creates a highly visible statement as to your sustainability commitment

A PV system installed on your house is a highly visible statement of your sustainability commitement to country, neighbours and the general public. This can be enhanced through the installation of our optional monitoring system, which monitors the live energy usage of the home and solar output, and can be viewed both online and in an onsite display.

Solar is a great investment with an ROI of within 5 years.

Solar Leasing

A solar leasing option where a monthly fee is paid towards the payment of the entire solar panel system. By applying for solar lease you have an account and approval from BOK (Bank of Khyber), all payments and schedule by the BOK.

Pakistan Solar Services the one & only renewable energy solution provider who listed in BOK for all over Pakistan specially in Sindh.

Power Payment Agreement

This payment option is a unique way for businesses or industrials as well as home owners to save money on their electric bill. With a power purchase agreement (PPA), you've to pay the upfront cost of solar power system, you may received monthly/yearly amount from installed solar panels and use the electricity they generate.

According to recent report 10% of home owners in Punjab with mature solar markets chose a solar lease or PPA.

Very low maintenance

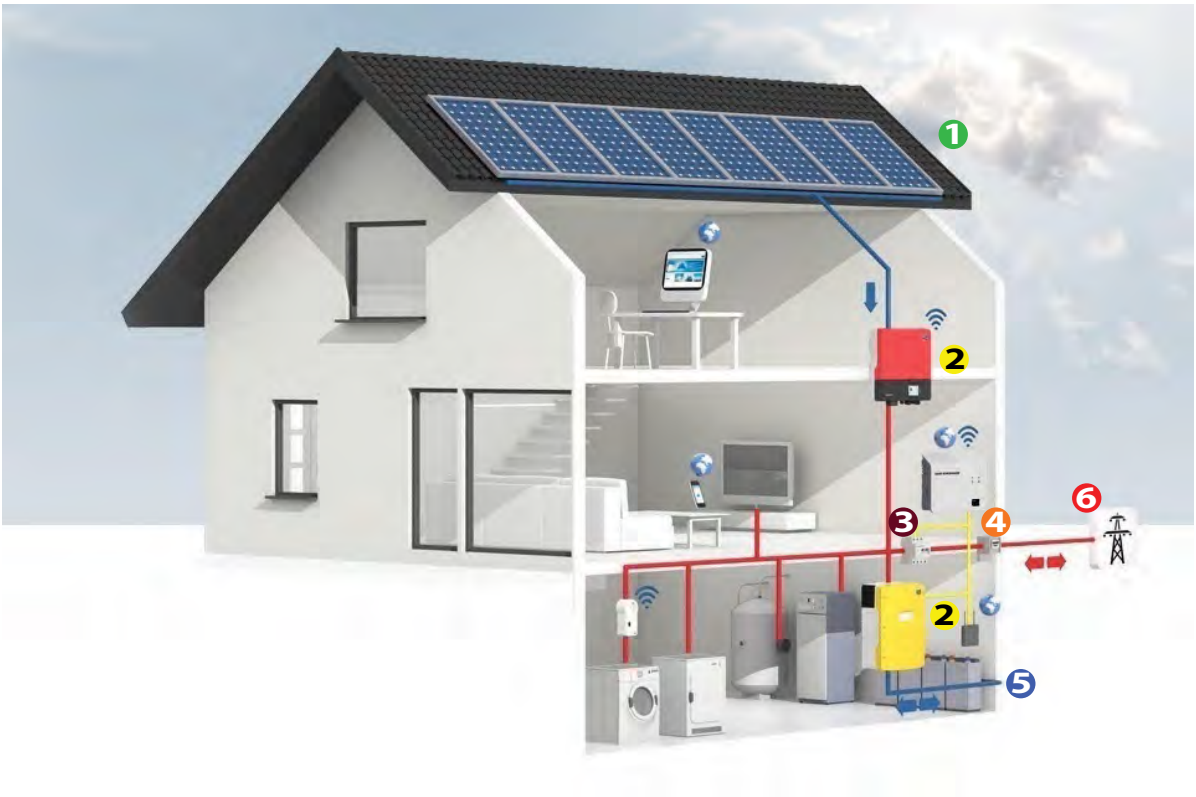
Solar power plant required very low maintenance such as solar panel cleaning from dust to make sure output generate in full eficiency.

But generally in Pakistan various PV plant lose their efficiency after one or two years even PV plant properly clean regular due to products are using ready-stock or even under sizing of power plant.

The Pakistan Solar Services requested several times to Government officials through publishing advertisment on high circulated news papers and mentioned products with brand name which are not even close to C grade products, and ask for create a regulatory division who able to check products quality available any solar solution provider. Pakistan Solar Services uses only PEC accredited designers and installers, as well as equipment for all systems. Our panels are supplied by Chinese (European Standard), a Tier 1 panel manufacturer, which has been manufacturing solar panels for over 20 years. The other components, including inverters, and cable are sourced from manufacturers that have obtained all relevant accreditation, including IEC, CEC, AS and offer a minimum of 1 to 15 years warranties, which can be extended upon request and mounting structure design and manufactruing at PAKSOLAR own facility.

How does Solar work?

A typical solar power system consists of the following components:



1 Photovoltaic modules

Also known as solar panels; directly convert energy in the form of sunlight into direct current (DC) electrical energy.

2 Inverter

An inverter changes the solar DC power into 230V alternating current (AC), enabling it to be used at your facility, store in battery or and exported to the grid ie your system is off-grid or on-grid.

3 Switchboard

AC power from the inverter travels to the switchboard for use in your facility. The switchboard contains the Solar Supply Main Switch, which is used to isolate the system.

4 Electricity meter

The meter records the electricity sent to the grid from your solar system as well as the electricity consumed from the grid.

5 Battery bank

Solar power during daytime store the energy on battery back which will be use at night time or during load-shedding for certain loads as per its backup hour design to store power.

6 Electricity grid

Any surplus electricity generated by the system is sold back to your electricity retailer through the grid.

Our Solution

We offer a turnkey solution from initial feasibility through to installation and final commissioning, including management the following key tasks:

- Energy audit (prposed energy efficient products);
- Feasibility study provides a comprehensive technical and energy study on the estimated energy product of your system;
- Running different loads through load management to save more unit cost from regular electricity;
- Registration and sale of solar electric;
- Finance procurement through BOK (Bank of Khyber) up to 2 Million.

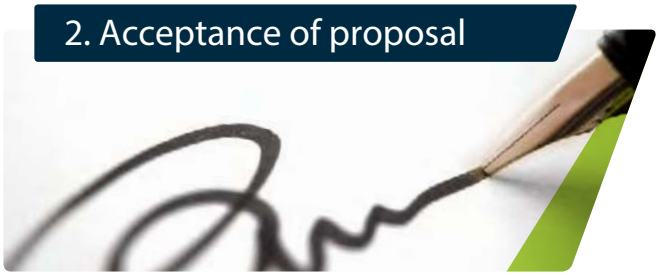
Solar Off-Grid system installed at ITMSs Chapal Suncity, Karachi by PAKSOLAR

Our Process

1. Proposal

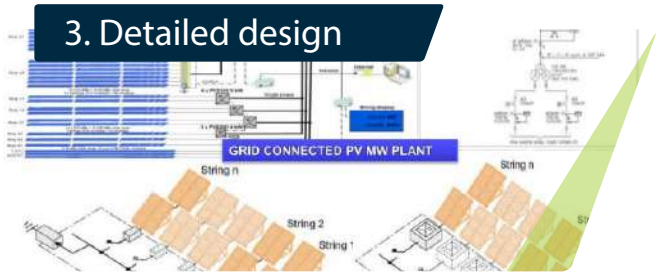
- Site visit
- Electricity usage analysis
- System output calculations
- Quotation

2. Acceptance of proposal



- Your commitment to the project, allowing us to begin detailed design

3. Detailed design

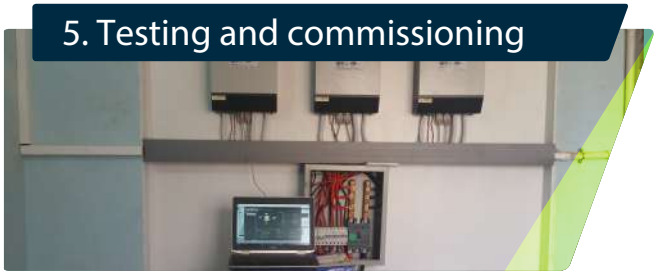


- Electrical design of solar power system
- Structural design

4. Installation

- Installation of the system, programmed to avoid disruption to the operation of your dialy work or business

5. Testing and commissioning



- Ensures that the entire system is installed safely and is working optimally

Analysis of Results

GEOGRAPHY AND CLIMATE

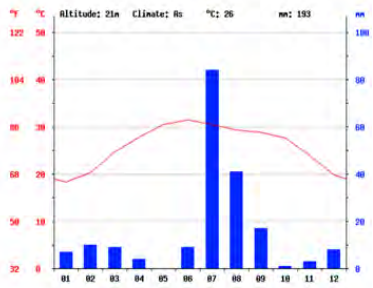
Karachi stands in the plateau having Arabian city south between longitude 67°31. East, latitude 24°53 North, with an elevation of 977.88 feet elevation (32596.) above sea level. Karachi features a hot desert climate The climate of the district can see extremes, with a summer maximum temperature 59 °C (138 °F) and a winter temperature of −20 °C (1.2 °F).The mean maximum and minimum temperature in summer are 59 °C (138 °F) and 50 °C (125 °F) respectively. In winter it peaks at around 25 °C (75 °F) and 6 °C (42 °F) respectively.

Climate table

month	1	2	3	4	5	6	7	8	9	10	11	12
mm	7	10	9	4	0	9	84	41	17	1	3	8
°C	18.2	20.3	24.6	27.8	30.5	31.4	30.4	29.2	28.7	27.6	24	19.8
°C (min)	11.4	13.6	18.4	22.3	25.8	28.1	27.5	26.5	25.2	21.6	16.9	12.8
°C (max)	25.1	27.1	30.8	33.3	35.2	34.7	33.4	32	32.3	33.7	31.1	26.9
°F	64.8	68.5	76.3	82	86.9	88.5	86.7	84.6	83.7	81.7	75.2	67.6
°F (min)	52.5	56.5	65.1	72.1	78.4	82.6	81.5	79.7	77.4	78.9	62.4	55
°F (max)	77.2	80.8	87.4	91.9	95.4	94.5	92.1	89.6	90.1	92.7	88	80.4

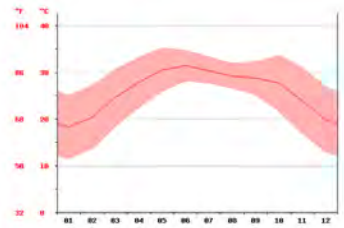
The difference in precipitation between the driest month and the wettest month is 84 mm. The average temperatures vary during the year by 13.2 °C.

Climate graph



The driest month is May with 0 mm. Most precipitation falls in July, with an

Temperature graph



The warmest month of the year is June with an average temperature of 31.4 °C. In January, the average temperature is 18.2 °C. It is the lowest average temperature of the whole year

Climate table

month	1	2	3	4	5	6	7	8	9	10	11	12
mm	7	10	9	4	0	9	84	41	17	1	3	8
°C	18.2	20.3	24.6	27.8	30.5	31.4	30.4	29.2	28.7	27.6	24	19.8
°C (min)	11.4	13.6	18.4	22.3	25.8	28.1	27.5	26.5	25.2	21.6	16.9	12.8
°C (max)	25.1	27.1	30.8	33.3	35.2	34.7	33.4	32	32.3	33.7	31.1	26.9
°F	64.8	68.5	76.3	82	86.9	88.5	86.7	84.6	83.7	81.7	75.2	67.6
°F (min)	52.5	56.5	65.1	72.1	78.4	82.6	81.5	79.7	77.4	78.9	62.4	55
°F (max)	77.2	80.8	87.4	91.9	95.4	94.5	92.1	89.6	90.1	92.7	88	80.4

The difference in precipitation between the driest month and the wettest month is 84 mm. The average temperatures vary during the year by 13.2 °C.

A custom designed system will ensure the best financial return for your organisation

System Components

Solar Panels

Our panels are supplied by SolarWorld, Canadian Solar, BLD Solar, Renesola, Jinko Solar and OSDA Solar, a Tier 1 panel manufacturer, which has been manufacturing solar panels for 15 to over 40 years.

The other components, including inverters, breakers, batteries and cable are sourced from manufacturers that have obtained all relevant accreditation, including IEC, CEC, TUV and offer minimum of 1 to 5 years warranties, ehich can be extended if required, and mounting equipment manufacting in our own facility.

Sunmodule® Plus SW 265 mono

TUV Power controlled:
Lowest measuring tolerance in industry

Every component is tested to meet
3 times IEC requirements

Designed to withstand heavy
accumulations of snow and ice

Sunmodule Plus:
Positive performance tolerance

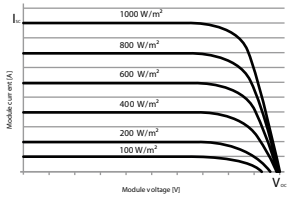
25-year linear performance warranty
and 10-year product warranty

Glass with anti-reflective coating

PERFORMANCE UNDER STANDARD TEST CONDITIONS (STC)*

Maximum power	P_{max}	265 Wp
Open circuit voltage	V_{oc}	39.0 V
Maximum power point voltage	V_{mpp}	30.8 V
Short circuit current	I_{sc}	9.31 A
Maximum power point current	I_{mpp}	8.69 A

*STC: 1000 W/m², 25°C, AM 1.5
1) Measuring tolerance (P_{max}) traceable to TUV Rheinland: +/- 2% (TUV Power Controlled).



Fully-automated production lines and seamless monitoring of the process and material ensure the quality that the company sets as its benchmark for its sites worldwide.

Plus-Sorting guarantees highest system efficiency. SolarWorld only delivers modules that have greater than or equal to the nameplate rated power.

WARRANTY

25 years linear performance guarantee and extension of product warranty to 10 years
SolarWorld guarantees a maximum performance degression of 0.7% p.a. in the course of 25 years, a significant added value compared to the two-phase warranties common in the industry. In addition, SolarWorld is offering a product warranty, which has been extended to 10 years.*

UL 1703

ISO 9001
ISO 14001
Certified

KuMax

HIGH EFFICIENCY MONO PERC MODULE

CS3U-380|385|390|395|400MS

(1000 V / 1500 V)

MBB 5BB

MORE POWER

Low power loss in cell connection

Low NMOT: 42 ± 3 °C
Low temperature coefficient (Pmax): -0.36 % / °C

Better shading tolerance

High PTC rating of up to: 93.24 %

MORE RELIABLE

Lower hot spot temperature

Minimizes micro-cracks

Heavy snow load up to 5400 Pa, wind load up to 3600 Pa*

25 years **linear power output warranty***

12 years **enhanced product warranty on materials and workmanship***

*According to the applicable Canadian Solar Limited Warranty Statement.

MANAGEMENT SYSTEM CERTIFICATES

ISO 9001:2015 / Quality management system
ISO 14001:2015 / Standards for environmental management system
OHSAS 18001:2007 / International standards for occupational health & safety

PRODUCT CERTIFICATES*

IEC 61215 / IEC 61730: VDE / CE / CQC / MCS / KS / INMETRO
UL 1703 / IEC 61215 performance: CEC listed (US)
UL 1703: CSA / IEC 61701 ED2: VDE / IEC 62716: VDE / IEC 60068-2-68: SGS
Take-e-way

* As there are different certification requirements in different markets, please contact your local Canadian Solar sales representative for the specific certificates applicable to the products in the region in which the products are to be used.

CANADIAN SOLAR INC. is committed to providing high quality solar products, solar system solutions and services to customers around the world. No. 1 module supplier for quality and performance/price ratio in IHS Module Customer Insight Survey. As a leading PV project developer and manufacturer of solar modules with over 36 GW deployed around the world since 2001.

* For detailed information, please refer to the Installation Manual.

CANADIAN SOLAR INC.
545 Speedvale Avenue West, Guelph, Ontario N1K 1E6, Canada, www.canadiansolar.com, support@canadiansolar.com

www.jinkosolar.com

Jinko Solar
Building Your Trust in Solar

Cheetah Plus HC 78M

425-445 Watt

MONO PERC HALF CELL MODULE

Positive power tolerance of 0~+3%

- Half Cell
- Mono PERC 78 Cell

Cheetah

PERC

KEY FEATURES

5 Busbar Solar Cell
5 busbar solar cell adopts new technology to improve the efficiency of modules , offers a better aesthetic appearance, making it perfect for rooftop installation.

High Efficiency
Higher module conversion efficiency (up to 20.50%) benefit from half cell structure(low resistance characteristic).

PID Resistance
Excellent Anti-PID performance guarantee limited power degradation for mass production.

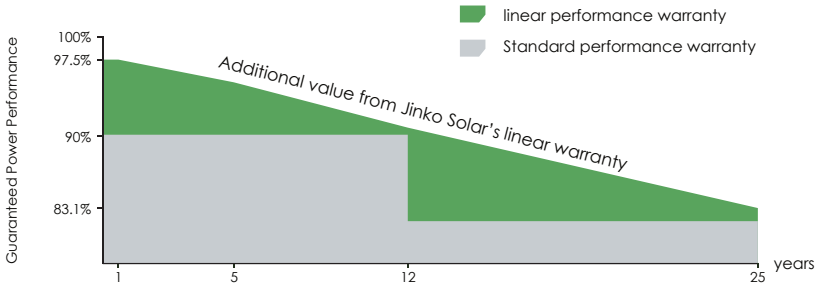
Low-light Performance
Advanced glass and cell surface textured design ensure excellent performance in low-light environment.

Severe Weather Resilience
Certified to withstand: wind load (2400 Pascal) and snow load (5400 Pascal).

Durability Against Extreme Environmental Conditions
High salt mist and ammonia resistance certified by TUV NORD.

LINEAR PERFORMANCE WARRANTY

12 Year Product Warranty • 25 Year Linear Power Warranty



- ISO9001:2015, ISO14001:2015, ISO45001:2018 certified factory
- IEC61215, IEC61730, UL1703 certified product

Nomenclature:

JKMxxxM-66/78H-V

Code	Cell	Code	Certification
null	Full	null	1000V
H	Half	V	1500V

Poly

CSUNPOWER®
Power the clean world

CSP345-72P

Poly Module

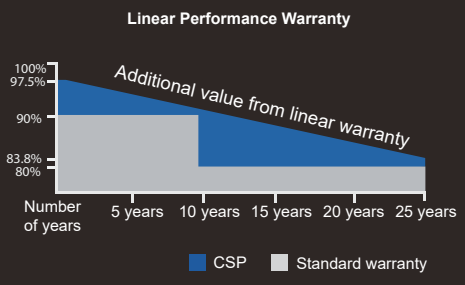
CSP345-72P CSP340-72P
CSP335-72P CSP330-72P

17.80%
Maximum Module Efficiency

345 Wp
Rated Maximum Power

12 Years
Material & Workmanship Warranty

25 Years
Linear Power Output Warranty



5 Busbar Solar Cell
5 busbar solar cell adopts new technology to improve the efficiency of modules , offers a better aesthetic appearance.

PID Free
Excellent Anti-PID performance from improved cell technology and selected packaging material.

Low-light Performance
Excellent performance under weak light conditions.

Load Capacity Enhancement
Certificated to withstand wind (2400 Pa) and snow load (5400 Pa).

Harsh Environment Adaptability
Reliable quality enables module to have better sustainability even in desert, farms or near the coast.

- CSUNPOWER(CSP) is one of the world leading solar solution experts. We are specialized in high efficient solar module research, manufacturing and distribution. Meanwhile, to utilize the advantage of our technology innovation and project operation, we provide our customers with comprehensive solutions for the whole lifecycle of solar project.
- Till the end of 2018, we accumulatively distributed more than 10GW solar modules, developed and built 500MW solar projects worldwide. Our sales network covers more than 50 countries in the world.

Note:

Parameters in this datasheet do not refer to parameters of a single solar module, also not the commitment content in the contract. This datasheet is used only for comparison of different module types. CSUNPOWER does not guarantee that it is completely accurate. CSUNPOWER is entitled to adjust the parameters without prior notice.

System Components

Inverters

SUNNY BOY 3000TL / 3600TL / 4000TL / 5000TL

With Reactive Power Control (Three phase)

Features:

Efficient

- Maximum Efficiency of 97%
- Multistring technology in all power classes
- Cost savings resulting from fewer parallel strings
- Shade management with OptiTrac Global Peak

Flexible

- Maximum DC input voltage of 750 V
- Integrated grid management functions and reactive power provision

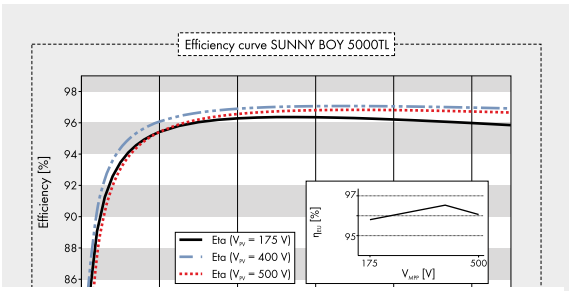
Easy to Use

- Fanless
- Simplified wall mounting
- SUNCLIX DC plug-in system
- Fast connection without tools

Communicative

- Simple country configuration
- Bluetooth® and Speedwire/Webconnect technology as standard

Efficiency Curve



www.SunnyPortal.com
Professional PV system monitoring, management and data display

Smart Energy Center

inter solar award 2019 WINNER

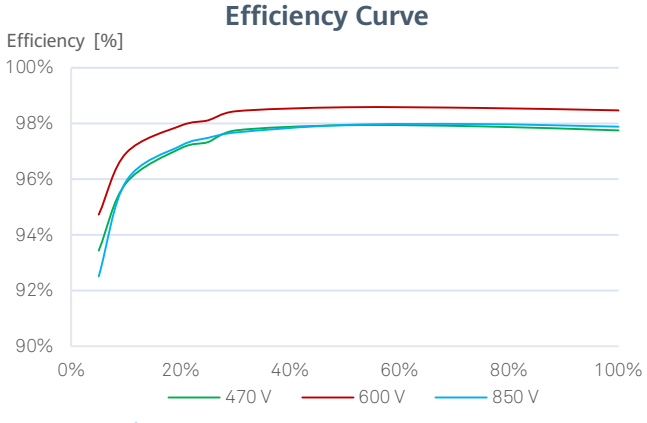
Higher Revenue
Max. efficiency 98.6%

Simple & Easy
17 kg

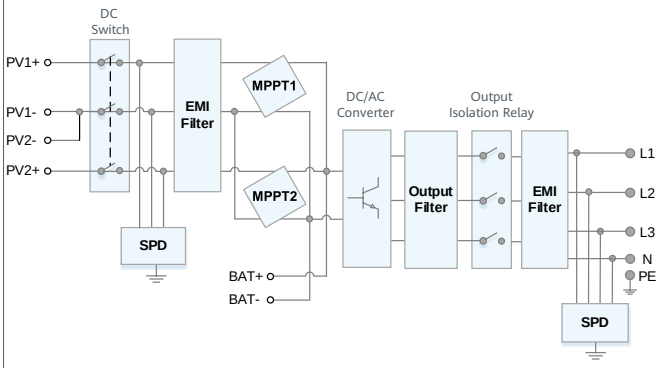
Battery Ready
Plug & Plug battery interface

Safe & Reliable
Arc fault protection

Efficiency Curve



Circuit Diagram



SUN2000-3/4/5/6/8/10KTL-M0

AEROX 5.2 KW SOLAR INVERTER

5 YEARS WARRANTY
2 YEARS PRODUCT WARRANTY
3 YEARS SERVICE WARRANTY

PRODUCT FEATURES

- 1st inverter in Pakistan with Grid-tie and Self-consumption feature
- Upgraded 3rd generation smart and intelligent solar inverter
- Zero transfer time
- Parallel up to 9 Units with optional kit
- Efficiently Work without battery
- Upgraded MPPT based solar charge controller up to 5000Watts
- Integrated Bluetooth interface with Android App
- Battery Equalization
- Data logging and Storage function
- Energy Prioritization according to the timer
- Conformal Coating to Prevent from Dust and Humidity
- Compatible with (Li-ion, LiFePo4 and etc.) batteries with BMS

ANTI DUST FILTERS — **ANTI DUST KIT**

UP GRADED MODEL — NEW ATTRACTIVE DESIGN

0 MS Transfer Time

3rd GENERATION Upgraded

GRID FEEDING OPTION

CONTROL THROUGH ANDROID APP

BLUETOOTH CONNECTING

OTG USB CONNECTING

+92-21-34160010 ww.paksolarservices.com info@paksolarservices.com

System Components

Inverters

AXPERT DUO / TRI OFF-GRID INVERTER
With Large Charge controller (Single phase)

Features:

Efficient

- Maximum Efficiency of 90% ~ 93%
- Multistring technology in all power (Parallel operation with up to 6 units *5KVA)
- Cost savings resulting from fewer parallel strings
- Wide battery input range
- Overload and short circuit protection

Flexible

- Maximum DC input voltage of 145VDC
- Selectable high power charging current

Easy to Use

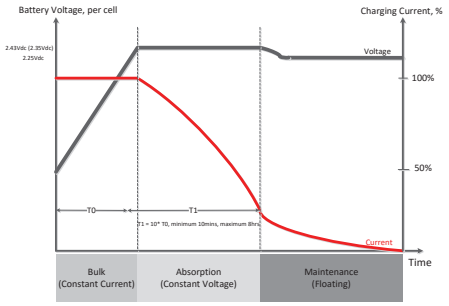
- Compatible to mains voltage or
- generator power
- Simplified wall mounting
- Wide battery input range

Communicative

- PC/Laptop connect technology as standard

Axpert Plus Duo 3K-48 | **Axpert Plus Duo 5K** | **Axpert Plus Tri 5K**

Charging Curve



www.voltronicpower.com
Leading manufacturer of Inverters, voltage regulator (AVR) and UPS.

Energy Monitoring

We can also provide energy and solar monitoring cd-applications as part of the overall installation, allowing you to track the energy usage of your facility and energy generation from your solar power system in real-time.

WatchPower is a smart solar inverter monitoring software to monitor multiple devices via USB and serail port at the same time. The major functions of WatchPower monitoring software include data log for devices, power generation statistics, alram messages, fault messages and parameter settings for devices.

Features to help you save energy.

- Automatic and real-time data aqquistion of devices and secured data log saving.
- Graphic display of device data for quick and easy reading.
- Warning notifications or fault alarams via mobile messenger, tray message and e-mail.
- asy diagnosis from event statistics and amount calculation for energy saving.
- Supports online upgrade and manually upgrade.

System Finance

We can also assist in the procurement of bank finance for the capital cost of the system.

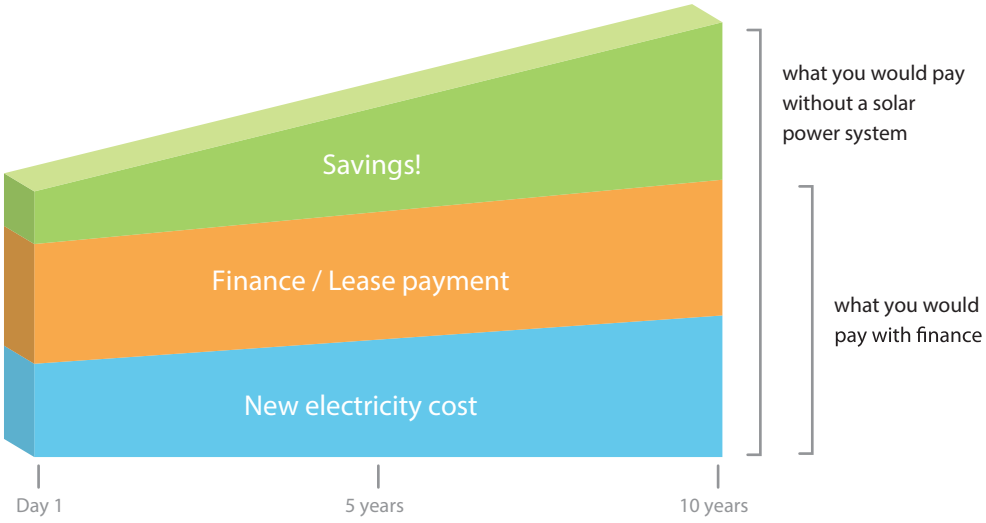
Pakistan Solar Services is now a part of KPK renowned renewable energy consumer banking BOK (Bank of Khyber) on their "ROSHAN GHAR" and "RAAST ROSHAN GHAR" projects (through Islamic & Conventional Financing) across Pakistan.

Eligibility:

Permanent Employee, with minimum service history of 5 years. Age 22 to 58 years, it shall not be more than 60 years at the time of maturity of finance facility. Average monthly verifiable income should be 3 times of the proposed monthly installment; with minimum monthly salary of PKR 25,000/-. Proposed loan installment plus other finance facilities installments (if any) should be less than 50% of the take home salary / income.

Facility Amount:

Category A: Minimum PKR 50,000/- Maximum PKR 200,000/-
Category B: Minimum PKR 200,001/- Maximum PKR 500,000/-
Category C: Minimum PKR 500,001/- Maximum PKR 2,000,000/-
Debt: Equity Ratio 75 : 25 {based on approved vendor's sale invoice}, exclusive of installation & transportation charges. Applicant must deposit its minimum 25% share with BOK while applying for facility.



PAKSOLAR

RENEWABLE ENERGY

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Email info@paksolarservices.cm

Professional
& Certified PV Installer

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