

DESIGN AND INSTALLATION OF 1KW SOLAR SYSTEM

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Abstract : The exhaustion of conventional resources and its effect on climate requires an urgent call for the substitute power resources to invite up the current power requirement. Solar energy is an endless, unsoiled and prospective energy source among all other non conventional energy options. As more concentration is being done on focal point for the development of renewable energy capital globally. To detect their feasibility it is necessary to do the economic and technical assessment of the resources.

In the recent era of electrical system development, the solar PV plays an important role in the energy conservation. This paper describes a complete analysis of 1 KW solar rooftop system. For this purpose we have installed 1KW solar rooftop system by considering the load forecasting, electrical design parameters, fabrication of structure by considering mechanical parameters and environmental consideration.

The described system was tested from 9.30 am to 4pm with 30 minutes of time interval. Analysis was done by considering PV voltage, PV current, solar power generated and solar inverter output and power consumption. The main purpose of testing was to identify the maximum power point and maximum working efficiency of solar system.

IndexTerms - Solar energy Solar Module, Solar Inverter, MPP

I. INTRODUCTION

Photovoltaic is a technology that reliably converts solar radiation into electricity. There are different type of modules depending on power ratings. Every module has a no of solar cells. Solar cells are fabricated by means of semiconductor such as silicon. PV cells generate electricity in clean manner concern which is the main concern for today's environment. Solar PV standalone systems have better power quality as compared to grid connected systems. In this paper 1KW PV system is designed for small room and analysis is based on real time data. Design and cost analysis of 1KW PV system on actual performance (Shahzad Ahsan, 2016).

II. OBJECTIVES

To study solar roof of system including equipment and system specification that is solar panel, charge controller and batteries.

The main aim of our project is to track on the maximum solar energy without solar radiation loss for the efficient use of solar energy

One time investment with minimum running expense

Identifying the maximum power point i.e. the time at which our system draws maximum power from solar energy

Summarization of all text report and representation in terms of graphical view.

They are s follows :-

- Current Vs Time
- Radiance Level Vs Time
- Voltage, Current, Power Vs Time
- Power Vs Radians
- Current Vs Radians

Block digram

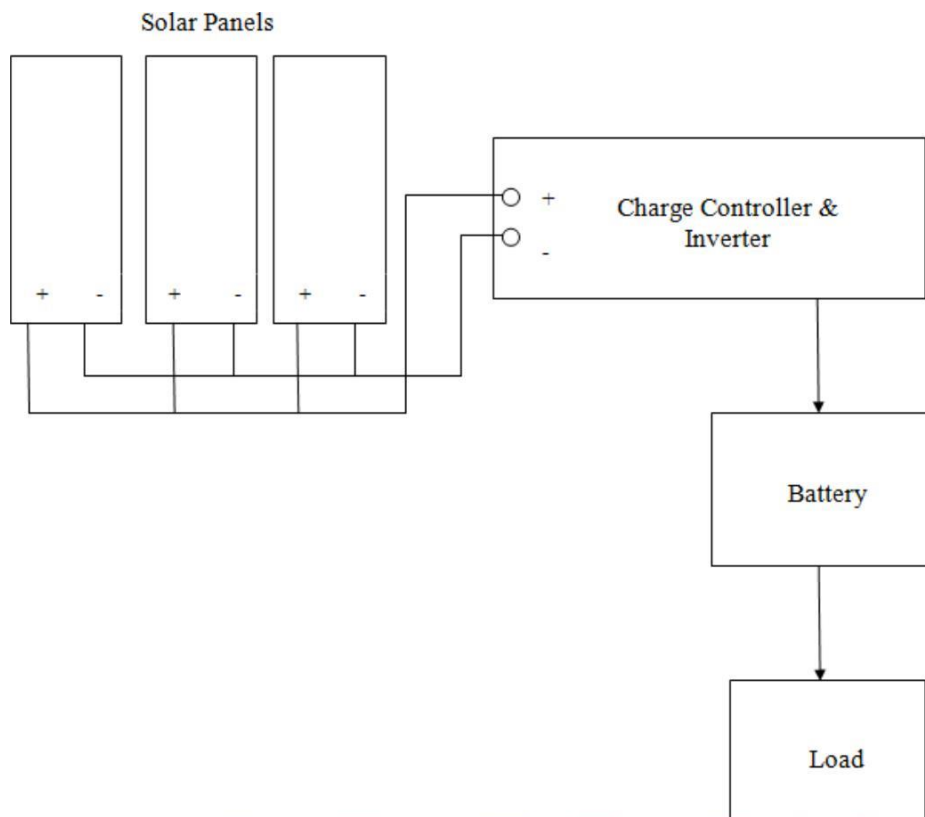


Fig No 1:- Block Diagram Of Solar Rooftop System

We have used 3 solar panels of polycrystalline. The output of the solar panel is DC in nature. The output is given to the charge controller. Charge controller is used to regulate the DC voltage. It is also eliminate the harmonics from the output of the solar panels. The lead acid battery is used for the charging purposes. The battery receives DC voltage. Inverter is used as a solar UPS in which the charge controller is inbuilt in it. Inverter is used to convert DC to AC. The Output from the solar panels is received by the charge controller and then inverter converts DC into AC. And AC voltage is given to the load.

HARDWARE REQUIREMENT

| Sr No | Hardware Required | Specifications | Quantity |
|-------|-------------------|----------------------|----------|
| 1. | Solar Panel | 325Watt, 36.77 Volts | 3 |
| 2. | Battery | 12Volts, 65 Ah | 2 |
| 3. | Inverter | 1KVA | 1 |
| 4. | Load | | 16 |

Table No 1 :- Hardware Requirement

Solar panel:-**Fig No 2 :- Solar Modules****Specifications:-**

Rated Peak power(Pmax)- 330 W

Rated Voltage(Vmp)- 36.77 V

Rated Current(Imp)- 8.98 A

Open Circuit Voltage(Voc)- 46.31

V Short Circuit Current(Isc)- 9.30 A

We have used polycrystalline type of solar panels. These are made of molten silicon that are casted into ingots then sliced into small squares. The cost of producing the solar cell is lower but the efficiency of solar cell is also lower than single-crystal cells by as much as 15%. Since the squares are also small, they can be packed closely together quite easily to increase energy production.

Inverter :-**Fig No 3:- Inverter (Solar UPS):-****Specifications:-**

Input Voltage – 100V To 280 V

Output Voltage On UPS Mode- 230 V \pm 10 V

Efficiency (peak) - > 80%

Max Solar Panel Current – 30A

Output Waveform On UPS Mode – Pure Sinewave

Solar Power Inverters can not draw current from battery continuously but it has some inbuilt function to save the battery from the deep discharge and ensures long life for battery. Solar Home Inverter in India also has the same function inbuilt to save the battery .Solar panels can be connected directly to ‘Hybrid Solar UPS’, as it has inbuilt solar charge controller. But we can not connect solar panels with dc output directly to ‘Solar Power Inverter’, we need a Solar charge controller device separately to regulate the current from solar panels. Both gadgets are share some common functionality but Solar Home UPS is different from normal Solar Power Inverter.

Battery :-

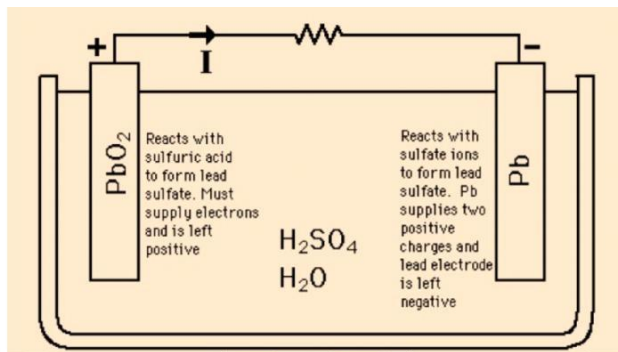


Fig No 4:-Lead Acid Battery

The common automobile batteries during which the electrodes are grids of antimonial lead-containing lead oxides that amendment in composition throughout charging and discharging. The electrolyte is diluted sulfuric acid. Industrial-type batteries will last as long as twenty years with moderate care, and even customary deep cycle batteries, like the golf automobile sort, ought to last 3-5 years.

Loads :-

| Equipments | No of Equipments |
|------------|------------------|
| Computer | 2 |
| Printer | 2 |
| Fan | 1 |
| Led lamp | 9 |
| Laptop | 1 |

Table No 2:- No of Load

Specification of structure

| | |
|--|---|
| Wind velocity withstand capacity | 150 KM/hr |
| Structural material | Hot deep galvanized steel with a minimum galvani |
| Bolt ,nuts ,fasteners,panel,mounting clamp | Stainless steel SS 304 |
| Mounting arrangement for RCC-flat roof | Concrete ballast made of pre-fabricated PCC (1:2:4) |
| Mounting arrangement for metal sheet roof | Mounting directly on the sheet metal, ensuring stability & wind withstanding capacity |

VI .APPLICATIONS AND ADVANTAGES

Applications

It is used for commercial as well as industrial purposes.

It is also used in airport for providing the energy. Eg. In Cochin 40 MW Solar rooftop system is installed.

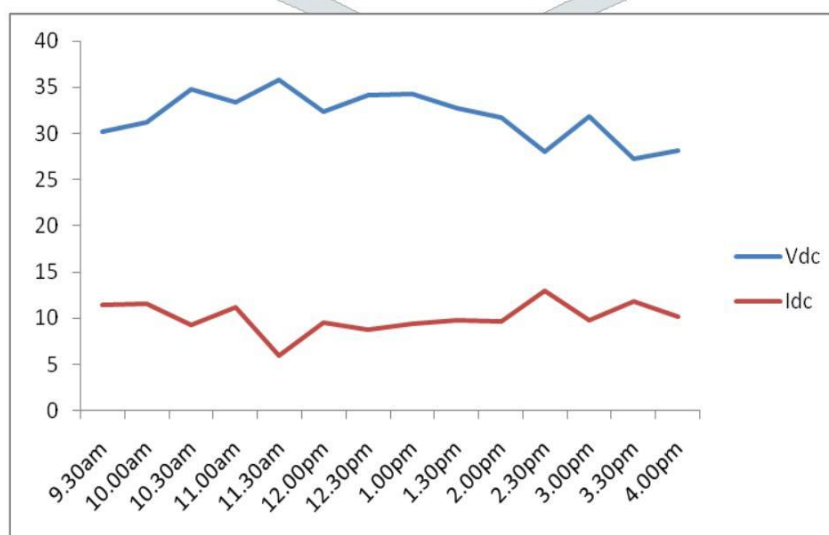
Advantages

It is off grid system. So due to this it is not needed to take the power from grid .

We can easily install the solar rooftop system in our houses or in commercial areas.

RESULT

| Time | Vdc(V) | Idc(A) | Solar Power(Watt) | Grid Units saved(KW hr) | Battery Voltage(V) | % Loading |
|---------|--------|--------|-------------------|-------------------------|--------------------|-----------|
| 9.30am | 30.2 | 11.5 | 367 | 0.061 | 28.5 | 10 |
| 10.00am | 31.2 | 11.6 | 380 | 0.216 | 28.6 | 11 |
| 10.30am | 34.8 | 9.3 | 353 | 0.143 | 28.9 | 9 |
| 11.00am | 33.4 | 11.2 | 383 | 0.279 | 28.8 | 11 |
| 11.30am | 35.8 | 6 | 245 | 0.405 | 27.9 | 13 |
| 12.00pm | 32.4 | 9.6 | 332 | 0.597 | 27.7 | 20 |
| 12.30pm | 34.1 | 8.8 | 334 | 0.03 | 27.8 | 19 |
| 1.00pm | 34.3 | 9.4 | 348 | 0.231 | 27.9 | 20 |
| 1.30pm | 32.7 | 9.8 | 340 | 0.469 | 27.7 | 21 |
| 2.00pm | 31.7 | 9.7 | 329 | 0.579 | 27.7 | 21 |
| 2.30pm | 28 | 13 | 388 | 0.788 | 27.3 | 29 |
| 3.00pm | 31.9 | 9.8 | 331 | 0.924 | 27.7 | 21 |
| 3.30pm | 27.3 | 11.8 | 346 | 1.093 | 27.3 | 26 |
| 4.00pm | 28.2 | 10.2 | 304 | 0.004 | 28.4 | 9 |



CONCLUSION

A 1KW PV system is studied for small homes only for rustic areas sited in India. Performance of the system and cost analysis. The energy produced by the PV system is also calculated hourly wise. Also the effect of global radiation on the generation of solar energy is depicted. In this project it is necessary to obtain the analyzation and properly estimation of the system with including measurement of the various parameters such as power, output voltage, current, solar radiation.

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