SELECTING CONTROLLERS AND INVERTORS FOR SOLAR CELLS

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Abstract

In this article we are going touch on some of the topics about solar cells, invertors , controllers as well as in what they are more beneficial and at their best sufficiency. Also we are going do discuss what are the advantages and disadvantages of installing solar cells and how much does one need to wait until those cells to pay off. And keeping with that theme we are also going touch on the ways that these devices including invertors, controllers as well as solar cells function.

Key words: AC,DC efficiency, monobloc, thermos, solar cells, solar radiation

Introduction

Solar cells can be arranged into large groupings called arrays. These arrays, composed of many thousands of individual cells, can function as central electric power stations, converting sunlight into electrical energy for distribution to industrial, commercial, and residential users [1]. Solar cells in much smaller configurations, commonly referred to as solar cell panels or simply solar panels, have been installed by homeowners on their rooftops to replace or augment their conventional electric supply. Solar cell panels also are used to provide electric power in many remote terrestrial locations where conventional electric power sources are either unavailable or prohibitively expensive to install. Because they have no moving parts that could need maintenance or fuels that would require replenishment, solar cells provide power for most space installations, from communications and weather satellites to space stations [2]. (Solar power is insufficient for space probes sent to the outer planets of the solar system or into interestler space, however, because of the diffusion of radiant energy with distance from the sun.)

For solar panels to be a reliable source of electricity it is necessary to provide additional elements in the system: cables, depending on the type of system (grid-connected FES, autonomous, reserve) depending on the structure, electronic inverter,

battery pack and charge-discharge controller. Such a system is a total solar photovoltaic system or solar station is called.Solar photoelectric plants used in ground conditions can be divided into the following classes according to their application [3-4]. These systems are mainly divided into 3:

1) Autonomous Solar Photoelectric Stations (AFES);

2) Reserve Solar Photoelectric Stations (RFES);

3) Solar photoelectric plants connected in parallel with the power grid.

In turn, components are used to operate these photoelectric plants. For example, inverter, controller, storage battery, etc. Below we will discuss how to choose an inverter and controller.

The term "invertorization" comes from the Latin inversio ─ to turn over, to change. The principle of operation of the inverter is the opposite of the principle of operation of the rectifier, that is, while the rectifier converts AC energy into DC energy, the inverter converts DC energy into AC energy [5-7].

Invertors. The inverter device's role is to control the voltage and frequency of the power supply and seamlessly change the rotation speed of motors used in home appliances and industrial machineries.

The first thing to keep in mind when it comes to enriching your understanding of the internal structure of an inverter device, is that the converter circuit converts alternating current (AC) coming from the power source into direct current (DC), and the inverter circuit changes the converted direct current (DC) back into alternating current (AC). They work as a set. The diagram below shows the role they both play and the way they work [8-12].

Converts low-voltage direct current to alternating current (220 V, 50 Hz). Inverters range from 250W to 8000W. Inverters of 3000W and above are often capable of handling up to several units. in parallel connection, the total output power must be increased by a suitable number. They can also be combined to build a 3-phase network. The electricity produced by modern sine wave inverters is better than what comes to your home from the local grid. There are also "modified" sine wave inverters - they are not very expensive, but they are suitable for most home applications. They can cause small noises in electronic equipment and telephones. An inverter can also act as a "buffer" between the home and the utility grid, allowing excess electricity to be sold to the utility grid. The main things to consider when choosing an inverter: Each inverter has a rated voltage, for example, 12V, 24V, etc. In general, the standard quantities for all household appliances designed for 220-230 volts and 50 hertz are important for us. Here, one of the most important factors is

that the output power of the inverter should be greater than the maximum power of the consumer. During operation, it is not recommended to start the charging and inverter process at the same time, and it is not recommended to open its internal parts during operation [13-16]. In practice, small solar power plants cannot be used without inverters, as we all know that the battery accumulates constant current charge. So what kind of inverters to choose. One and three-phase pure sine inverters can be used depending on the power to be installed in the house.

Inverter WK 500W 12/24/48 V

Controllers. As we all know, solar panels cannot be directly accumulated, because playing with the amount of voltage required by the batteries will cause them to fail. The solar power management device, i.e. controllers, serves this task, i.e. control of the charging process. The controller is an important element of a solar power plant and is considered to be the main mechanism for ensuring that the rest of the equipment works properly, especially that the batteries can be properly charged [17].

Here is how a typical controller looks like

There are two main types of control device:

• MPPT charge controller. It is a device that has a significant effect on the amount of energy collected, increasing it by 25-30% compared to other charge testers. The principle of operation of this device is based on the algorithm of tracking the maximum power point of the solar module. The efficiency of such systems is

high. Despite the high initial cost of this product, the payback period of the solar power plant is much shorter. If you have made a choice in favor of the MPPT controller, then the next step is to choose the right model according to the number of solar modules already selected and the technical parameters [18].

• We recommend using a PWM charge controller only in areas with very high solar activity. This is an "economical" version with a very simple algorithm. In regions with low solar activity, their use is not appropriate and not economical.

When choosing a battery charge tester, you should follow the following rules:

1. Input voltage. Manufacturers regulate the voltage of connected solar panels. Therefore, the maximum allowable input voltage indicated in the technical data of the control devices must correspond to the open circuit voltage of the solar cell (SB) or the sum of the open circuit voltages of a group of solar modules connected in series and the excess limit. at least 20% [19].

2. The total power of the solar panels should not exceed the product of the output current of the controller and the system voltage. In this case, it is necessary to obtain the system voltage for discharged batteries. Also, in case of abnormally high solar activity, at least 20% backup should be taken [20].

Conclusion

Solar energy is a renewable energy source, meaning you don’t ever use it up. Solar energy is clean. It creates no carbon emissions or other heat-trapping “greenhouse” gases. It avoids the environmental damage associated with mining or drilling for fossil fuels. Furthermore, solar energy also uses little to no water, unlike power plants that generate electricity using steam turbines.

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