

Photovoltaic Power Generation System

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1. Introduction

The use of sunlight as an energy source has long attracted interest as a clean and infinite substitute energy source replacing fossil fuels.

A photovoltaic power generation system (hereafter abbreviated as PV system in this paper) is an electric power generation system which serves to convert sunlight to electrical energy using solar cells. This system has found practical use in artificial satellites, desktop calculators, wristwatches etc. for more than ten years. However, the PV system has not found favor in the field of large-scale power generation due to its high cost.

However, in recent years, given increasing demand for electric power in Japan, obstacles to the construction of atomic power generation plants, international treaties mandating decreases in carbon dioxide emissions, among others have forced Japanese national policies to search for new energy sources, and given its advantages, paying special attention to enlarging PV system capacity.

In the Japanese government's 'New Energy Introduction Policy', outlined in 1994, targets for PV system generation were set at 0.4 million kW by the year 2000, and 4.6 million kW by the year 2010.

Electric power, as generated by solar cells, is DC voltage. Both voltage output and current may change depending upon the intensity of sunlight and the temperature of the solar cell.

A utility interactive inverter, integrated into the system, is the heart of the entire PV system as reported in this paper. An inverter refers to the technology which converts the DC output power from the solar cell to the same AC power which is normally supplied by electrical power companies. Use of an inverter enables one to feed power to normal AC-driven electric machinery, and to sell the excess (or dump) power to the electric power company.

In this paper, we shall report on the functions, characteristics, and example applications for the PV system.

2. Configuration of Standard System

- 2.1 Solar Cell Arrays
- 2.2 Current Collector Box
- 2.3 Utility Interactive Inverter
- 2.4 Measurement Block, Data Acquisition Block, Display Panel



Outside appearance of the inverter unit

3. Standard Specifications of the utility interactive inverter

4. Multifunction Expansion System

- 4.1 Example of A Multifunction System
- 4.2 Satisfying Requests for Multifunction Roles

5. Future Trends

6. Conclusion

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