ANALELE UNIVERSITĂȚII
"EFTIMIE MURGU" REȘIȚA
ANUL XV, NR. 1, 2008, ISSN 1453 - 7397

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Solar Photovoltaic Monitoring System, Implemented on the Location Resita

This paper presents the actual state of research in the field of solar photovoltaic conversion at the «Eftimie Murgu» University Resita, for the location Resita, a location with following geographic coordinates: 45^0 30' Nordic latitude and 21^0 59' east longitudes. The principal monitoriesed parameters are: solar radiation, module and ambient temperature, wind direction and speed, humidity, atmospheric pressure [2], a.o., in on-line mode, recorded in a data base with the possibility to view them on the Internet; added to this, the produced energy, from different types of photovoltaic modules, is counted and injected in the public grid to persuade the quality indicators of the installation.

Keywords: *solar photovoltaic, monitoring system, energy*

1. Introduction

To get concert data's about the behavior of a grid (220V, 50Hz) connected solar photovoltaic system in the location Resita, a system with an complete installed power of 720 W (four module of MultiSol type – each 180W) was put in function.

2. System description

The system is made from: four solar photovoltaic modules of type MultiSol, connected in series and an inverter Sunny Boy 1100, as in the principle scheme diagram, figure 1, shown, whose output is connected to the low tension public grid.

The *Sonny Boy 1100* Inverter [5] (produced by SMA) allows the conversion of the dc energy, produced by the photovoltaic modules, in ac energy, which is injected in the local low voltage grid, with 220 – 240V and 50 Hz frequency. Some inverter types produced by SMA can operate in grids with the frequency of 60 Hz too. The inverter is also foreseen with the *Sunny Boy Control*, which allows the

communication of the inverter with the equipment used in the system performance monitoring.

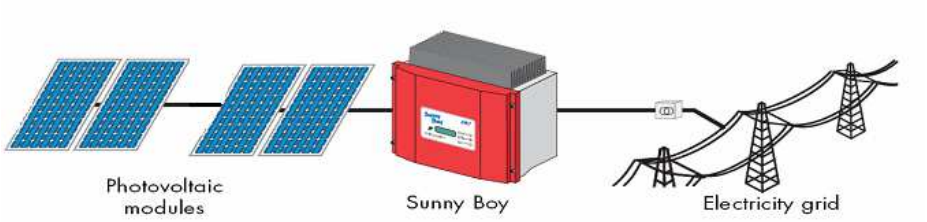

Figure 1 Principle scheme of a solar photovoltaic system connected to the public grid

To assure the monitoring of the climatologically parameters [1], the system includes a module to connect sensors, *Sunny Sensor Box* [4] and the sensors that measures relevant environmental parameters for the performances of the photovoltaic system. For this aim, as a standard feature, the system is fitted out with an sensor for solar radiation, integrated in the *Sunny Sensor Box* module, as well two external temperature sensors, for module and outside temperature. It exists also the possibility to connect more ore other sensors to this module, as sensor for the external radiation, anemometer or others.

Another element that appears in the communication structure, is the power injector RS485, that assures the energy connection of the *Sunny Sensor Box* at one hand, and the other assumes the data transmission to a communication module of SMA (for example Sunny Web Box), through this interface.

The *Sunny Web Box* [3] module realizes the connection between the photovoltaic system and user, in a local connection ore through the *Sunny Internet Portal* [6], where different option and feature for data analyzing and visualization are available for the user, on his PC ore Laptop, using a usual internet browser. To be able to communicate with different inverter types, the *Sunny Web Box* module uses a data transmission line of RS485 type and protocols for data transfer, specific for each inverter type.

To implement the monitoring scheme of the photovoltaic system and climatologic important parameters for the photovoltaic conversion, as presented figure 2, following connection had to be done: *Sunny Web Box* to the inverter, the inverter to the power injector RS485, the *Sunny Sensor Box* to the power injector RS485.

The complete scheme of the photovoltaic system, with his monitoring and the solar photovoltaic part is presented in figure 3.

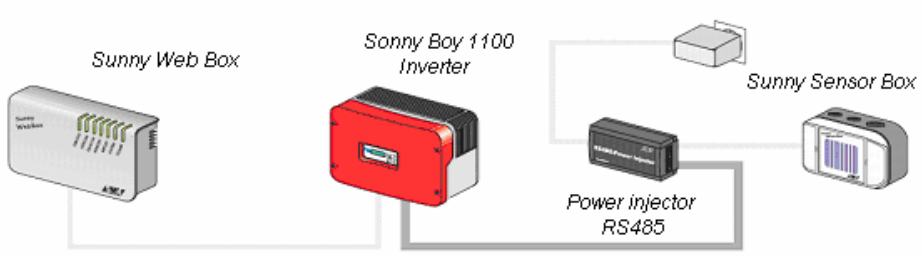

Figure 2 Monitoring scheme of the photovoltaic system

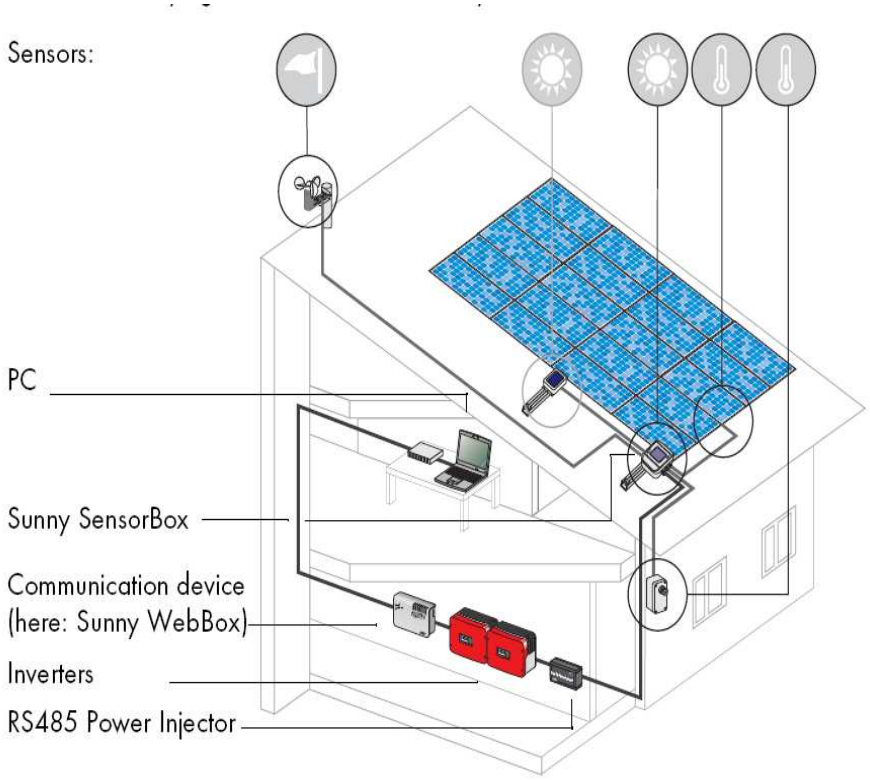

Figure 3. Complete scheme, photovoltaic and monitoring system

3. Conclusions

The paper presents the solar photovoltaic monitoring system installed at the "Eftimie Murgu" University Resita, in partnership with the "Energieinstitut" department of FH Gelsenkirchen, Germany. The next paper will present the operating mode to access on-line the measurements results ore the monitoriesed values from the data base, using the local connection ore the Sunny Internet Portal.

References

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[3] http://www.sma.de/de/produkte/anlagenueberwachung/sunny-webbox.html

[4] http://www.sma.de/de/produkte/anlagenueberwachung/sunny-sensorbox.html

[5] http://www.sma.de/de/produkte/solar-wechselrichter/sunny-boy/sunny-boy-1100-1700.html

[6] http://www.sma.de/de/produkte/anlagenueberwachung/sunny-portal.html

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