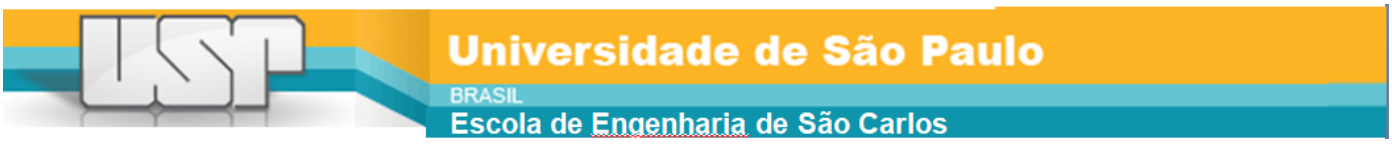


**Photovoltaic Power and Meteorological Monitoring System USP**

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## Summary

Phovoltaic generation is increasing around the world as an important alternative of energy production. Brazil has a great solar potential and, thus, the government has supported for the inclusion of this kind of energy by creating laws to facilitate the approval for the distributed utilities. In addition, there are also supports by agencies such as "Banco Nacional de Desenvolvimento". Therefore, studies to foresee the impact of inclusion of this type of energy in the network become necessary.

For this goal **the representation of those photovoltaic generators by equivalent model and the estimation of their parameter** become necessary. Usually manufactures of photovoltaic modules provide some information to obtain model parameters of those panels using standard test conditions of temperature, irradiance, and wind conditions. However, in real situation, rarely those conditions are similar of those where the photovoltaic modules are installed. Thus, differences between the outputs of simulation model and real measurements can appear that make a power forecast unsuccessful.

In addition, the development of a software to **forecast the photovoltaic power** is another important research about photovoltaic system. The software will support operator of photovoltaic power plants to take better decision when, for example, a sudden drop of photovoltaic power is about to happen in the system.

In Electrical and Computing Engineering Department/ São Paulo University-Sao Carlos campus, a small photovoltaic power plant and meteorological system was installed for research purpose.

**The photovoltaic system of 3,1kW is composed by:**

-12 photovoltaic panels of 265 Wp (polycristaline)

Model: GBR 265p

Manufacture: Globo Brasil

- 1 Power Inverter DC/AC Fronious 3,0kW with two maximum power point tracking (MPPT) with wifi communication.

Model: PRIMO 3.0-1

Manufacture: Fronius

Data monitoring: Voltage, Currents and Power output in DC (for each string) and AC for each 5 min.

**The meteorological monitoring System**

The system is composed by

- Wind Monitor Station (Anemometer)

Model: WMS-23S

Manufacture: Omega

- Piranometer:

Model: CS300

Manufacture: Campbell Sciencitic

- Temperature Sensors (contac):

Model:SA2C-RTD 3 100 B 200

Manufacture: Omega

- Collector Data Logger

Model: CR300 wifi

Manufacture: Campbel Scientific

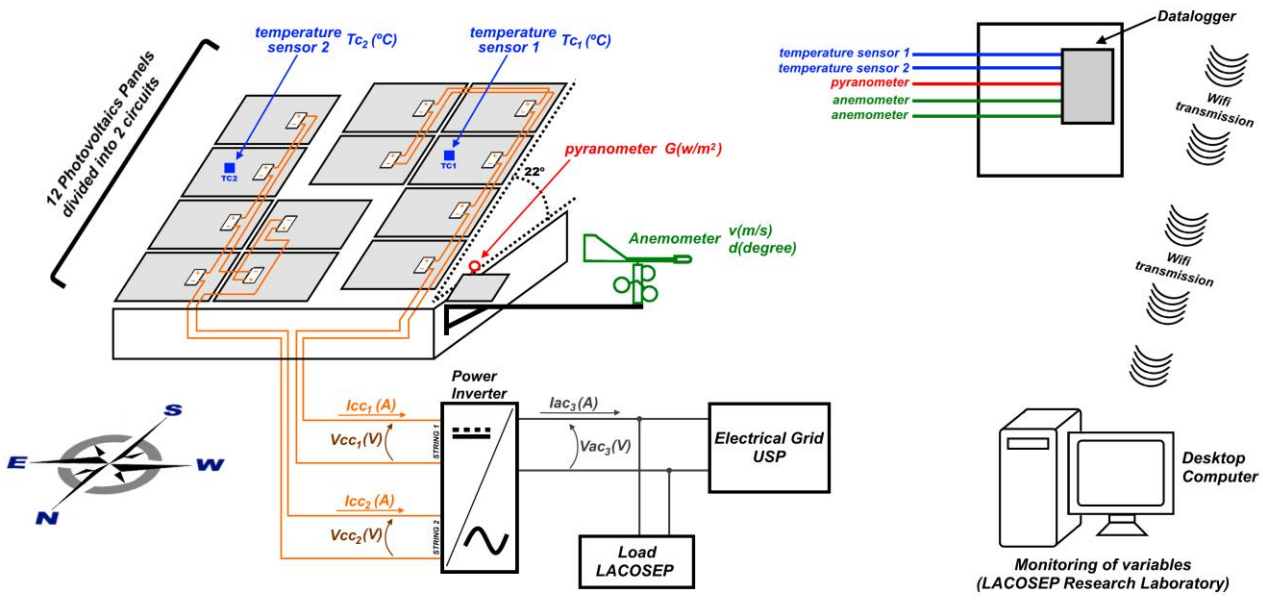


**Fig1: Schematic Photovoltaic Power and Meteorological Monitoring System USP**

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The power inverter make available the online monitoring of photovoltaic power in next site:

https://www.solarweb.com/

User Name:gd.lacosustentavel@gmail.com

Password:GDlaco_1278


**Fig2: Distribution of Photovoltaic panels for (Power of 3,1kWp)**

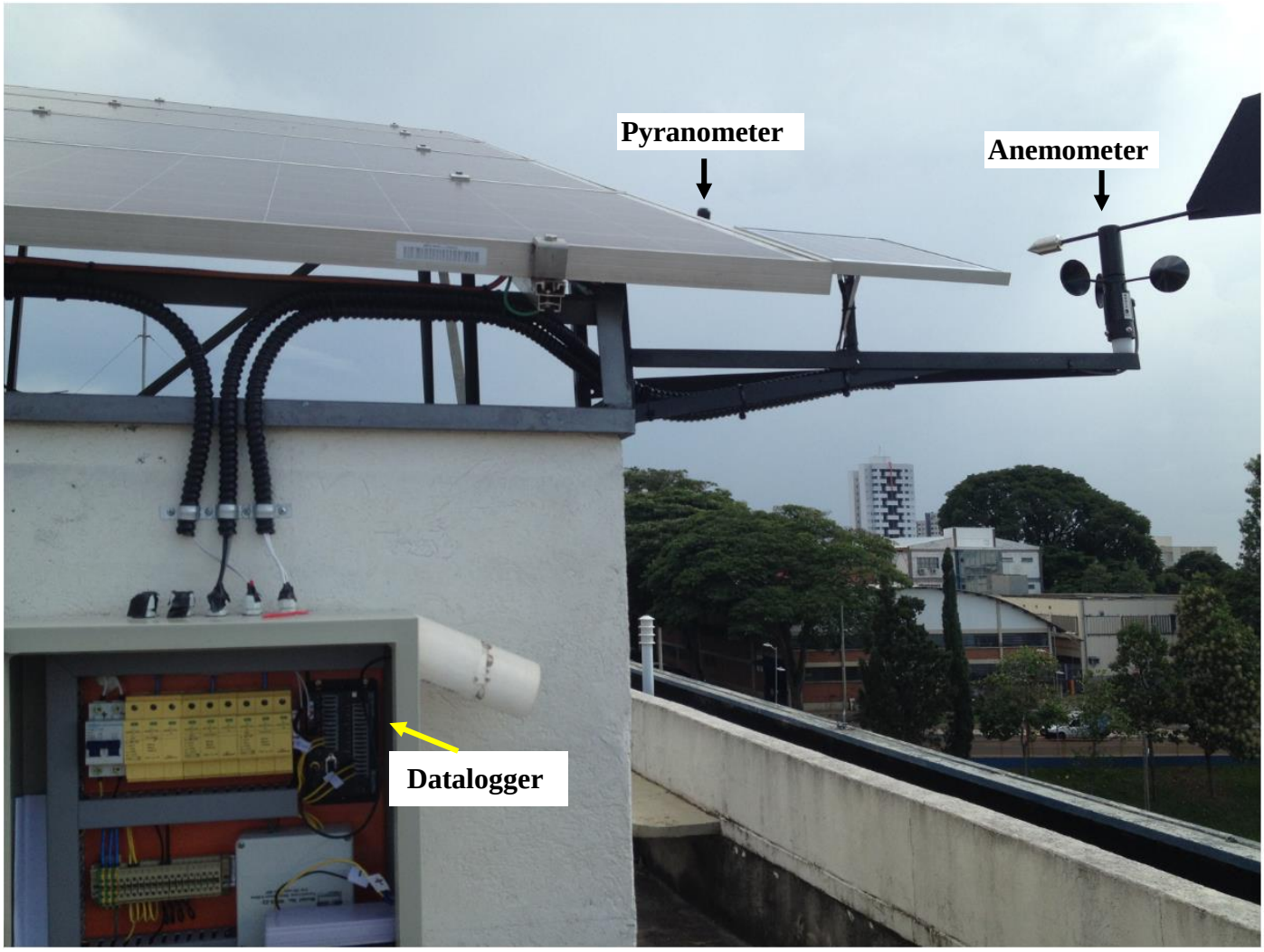


**Fig3: Distribution of meteorological measurements of photovoltaic system 3,1kW**

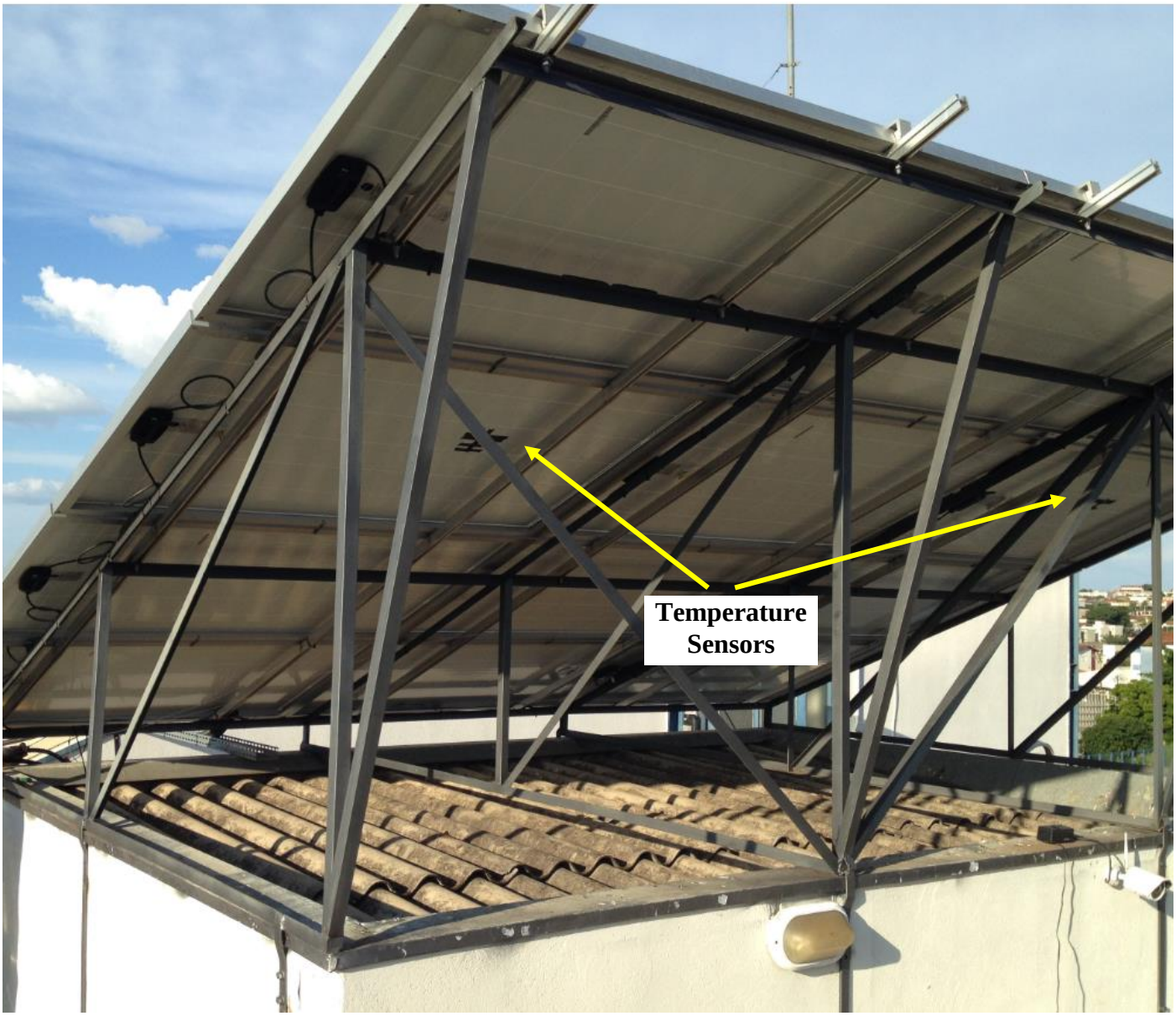


**Fig4: Distribution of Temperature cells of photovoltaic system 3,1kW**

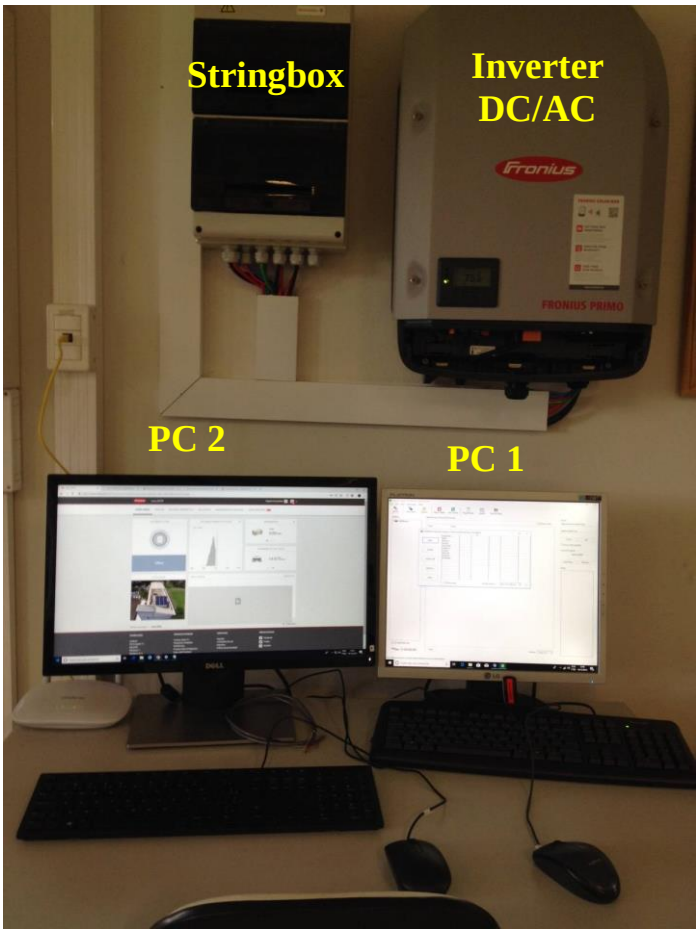


**Fig5: Monitoring System of photovoltaic system 3,1kW**