MEASUREMENT AND CONTROL SYSTEM FOR THERMO-SOLAR PLANT AND PERFORMANCE COMPARISON BETWEEN TRADITIONAL AND NANOFLUID SOLAR THERMAL COLLECTORS

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Abstract - ***Aim of this work is the design of a programmable electronic system for monitoring the environmental parameters and managing the electrical functions of a thermo-solar plant. The designed control unit detects data from temperature and light sensors, processes acquired information and commands external equipment (pumps, electric valves and power supplies) in order to optimize plant performances and maximize efficiency and energy savings. Recently several researches, in the field of solar thermal energy production, have demonstrated that nanofluid-based solar collectors present higher conversion efficiency. In this context, the designed control unit can be used to detect their operation parameters in order to compare the performances of nanofluid-based solar collector with those of traditional one. The electronic experimental setup is capable to monitor, at the same time, the two different types of solar collector in similar environmental conditions and to show on touch screen display the detected performances. In order to have reference data, experimental measurements have been carried out by using traditional water and Al_2O_3–based nanofluid thermo solar collectors. The obtained experimental data showed the benefit in terms of efficiency in the use of nanofluid as heat transfer fluid in such a system.***

Index terms: Control systems; electronic equipment; measurement; multisensor systems; signal processing; solar energy; solar thermal converters; energy savings.