A smart automation system for the management and control of a medium scale digester plant

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**Abstract.** The following paper was achieved in the framework of the project Ager 2 - “ Sustainability of the Olive - oil System – S.O.S. ”and describes the implementation of the control logic for a medium scale digester plant management through an automation system. Such a digester was developed to produce biogas and biomethane subsequently to anaerobic digestion of agri-food wastes, with a particular interest towards olive mill by-products. Temperature and pH are the main parameters that control the prototype running and automatism. The plants is fed with two matrices having respectively acid (in case of olive mill wastewater) and alkaline pH (i.e. livestock manure). Heating is ensured by a couple of armoured heater elements of 1500 W, while cooling, can occurs thanks to a water main directly connected to the reactor, whenever temperature exceeds the set thresholds. The control logic aims at maintaining temperature and pH within a certain range to guarantee the optimal process parameters. The automatic plant implements three PLC units, which manage the sensors able to acquire temperature and pH data for process control as well as pressure and flow sensors to determine biogas production. The control interface was designed to allow the user to control both manually and automatically the actuators, particularly: feed aspiration electric pump and relative solenoid valves, the mixer, the solenoid valve for the aspiration of cooling water and two resistors for heating. Furthermore, it allows setting process parameters; control process progress of and save data history. The interface enables to navigate between four different windows: manual control, automatic control, parameter setting and trends, which shows the progress of the measurements provided by the sensors in real-time.