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Research Article

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Waste Water Treatment Plant using PLC

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Abstract This research paper provides information about Waste Water Treatment Plant using PLC. This will give the information about treatment of waste water in automation. Water is used for drinking purpose, for steam production, irrigation etc. This uses a small control system. PLC programming languages are ladder diagram, Sequential function charts, Function Block Diagram, Structured Text, instruction lists. PLC runs the facility, Programmable Logic Controllers (PLC) continuously monitors the operation of valves and other equipment, receives and execute commands given by programmer. In this paper, the functions of PLC, the use of PLC and SCADA in sewage water treatment plants is implemented. Purified water is used for domestic and agricultural purposes based on ph.

Keywords PLC introduction, PLC working, Water treatment using PLC

Introduction

PLC are small industrial computer with modular design components to automate customized control process. PLC are often used in factories and industrial plant to control processes, motors, pumps, lights, fans, circuit breakers. Programmable Logic Controllers are used for continuously monitoring the input values from sensors and produce the outputs for the operation of actuators based on the program. Every PLC system comprise this 3 modules: CPU Module. Power Supply Module, Sensor Module.

PLC Working

PLC work can be divided into 3 areas:

- The power supply and rack
- The central processing unit
- The input/output (i/0) section

A Programmable Logic Controller (PLC) is a kind of computer generally utilized in commercial and industrial control applications. PLC's differ from office computers by the tasks that they perform and so, therefore, the hardware and software they use to perform these tasks. The fundamental components of a PLC are input modules or points, a Central Processing Unit (CPU), output modules or points, and a programming device. The type of input modules or points employed by a PLC depends upon the type of input devices used. Some input modules or points answer to digital inputs, also known as discrete inputs, which are either on or off. Other modules or inputs respond to analog signals. The first function of a PLC's input circuit is to change the signals send by these various sensors and switches into logic signals which are employed by the CPU which assess the status of input, output, and other variables [1].

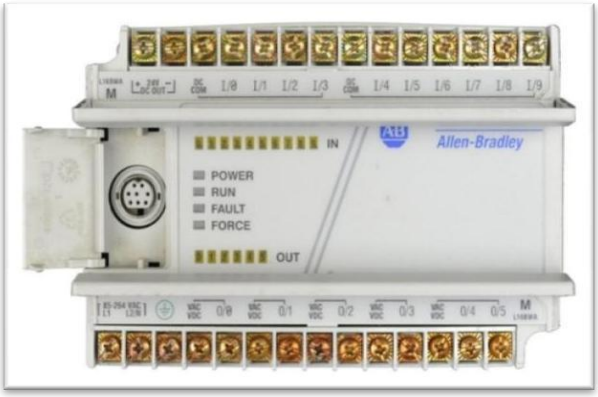

Figure 1: PLC (Allen Bradely) [2]

Working Process

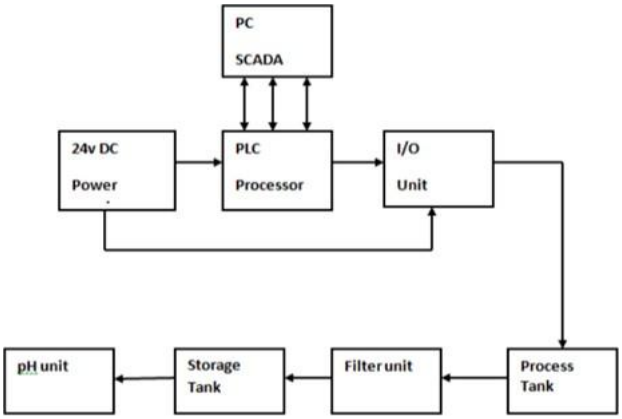

Figure 2: Project Diagram [3]

a) Power Supply Unit: It supplies 24v dc power to both plc processor and input-output unit of the PLC.
b) Primary Pump Room: The status and data signals of the pump motor, electronic butterfly valve, and on-site instruments are received and control signals are sent to this equipment. The motor running frequency and electric solenoid valve opening are automatically adjusted by pre-installed PID regulation programs.
c) Chemical adding and Chlorination Room: The status and data signals of on-site equipment and instruments are received and control signals are sent to this equipment and instruments. The operations of chemical adding and chlorination equipment are automatically controlled by automatic control programs.
d) Process Tank: The wastewater will fill in the process tank to remove the floated impurities as well as the sediments. The sediment removal is automatically operated under the sediment removal cycle. The cycle time and sediment removal time of sediment value can be modified in the control room. The filled water will be agitated and the floated impurities, as well as the sediments, will be removed through the dust valves.
e) Filter Tank: After the completion of process 1 & process 2, the water will get filtered in this filtering section. A filter tank is an important part of the water, used to filter water and suspended solids in the filtration process. During the filtration process, it needs to achieve the filter constant water level adjustment, filter backwash (air washing – water washing - gas-water mixed washing), and other functions. And the filtered water will send to the pH measurement process & for industrial usage by selecting the switch.
f) Storage Tank: The water will be stored in a storage tank after filtration.

Conclusion

This work deals with Waste Water treatment. The recent era is of PLC programming because of higher programming flexibility and ease, scalability, more memory, smaller sizes, very high-speed (gigabit) Ethernet,

and built-in wireless features.

In the future, PLC's will continuously evolve while adapting technology enhancement in communications, hardware, and software.

This project has been done using process control and monitoring of a Sewage water treatment plant. It has been designed to provide an expert system for total control of the process. It has shown a real-time operation state of the process, which allows us to monitor the process and rectify the error. The use of a PLC as a control instrument helps us in transmitting the control signals to various field devices, it enhances the compatibility of various equipments through interfaces and protocols, also make the interoperability with the SCADA implementation

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