

PLC-Based Photovoltaic Array Monitor

The client needed a data logging system to monitor the performance of individual modules in photovoltaic arrays installed on the rooftops of two buildings.

After meeting with the client, I prepared a conceptual design laying out various options and recommending alternatives. The chosen design installed voltage, current and RTD temperature sensors on selected modules in the arrays. The signals from the sensors were brought to Allen Bradley CompactLogix PLCs, located on the top floor of each building.

A weather station was included to record ambient temperature, humidity, wind speed and direction, and irradiance (global horizontal, direct, and diffuse). The weather station communicated with one of the PLCs over a dedicated Ethernet communication link using Modbus protocol.



Weather station

Ethernet ports on the PLCs were connected to the client's LAN to provide the information to a tower PC running Microsoft SQL Server and Wonderware Historian. The PC was configured with Raid 5 hot swappable hard drives to ensure reliable data storage and retrieval for the duration of the project.

A second PC was configured with two high definition 46 inch touch sensitive monitors to serve as a demonstration tool for visitors.

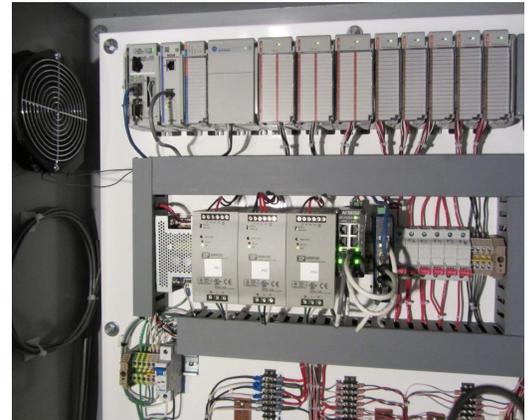
The system also included high definition Power-Over-Ethernet video cameras to monitor the arrays. Stills from the cameras are archived using LongWatch software on the tower PC.

For this project, I completed the following:

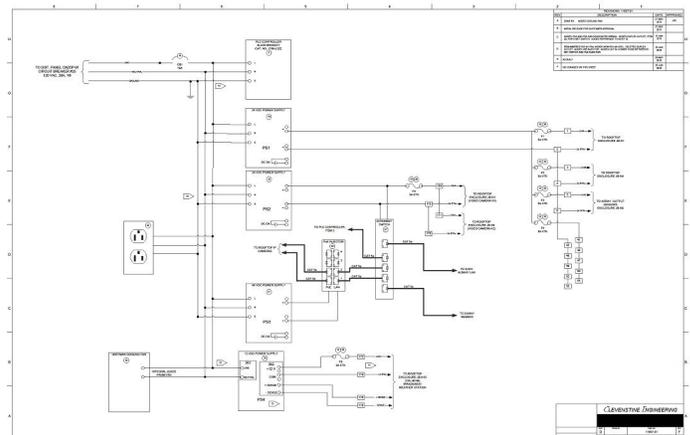
- Developed a full design, selecting and specifying all components and installation details
- Prepared a complete drawing package to support installation and ongoing maintenance
- Provided integration services to ensure compatibility between components . included bringing PLC components to weather station supplier to prototype the custom Ethernet/Modbus communication
- Obtained and negotiated proposals from the various suppliers including the electrical contractor
- Commissioned the PLCs including writing, loading, and de-bugging the PLC RSLogix5000 program
- Coordinated with a sub-contractor to program the tower PC

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Allen-Bradley CompactLogix PLC installed in one of the clients buildings



One of over 30 sheets defining the project