CAS DATALOGGERS

Monitoring Solar Hot Water Systems

dataTaker DT80 Intelligent Universal Data Logger

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An installer of solar hot water systems needed a data logger that could monitor the temperature, water flow rate, and several other parameters at various points in the system, control the different circulating pumps, record the data for performance tracking, and monitor the energy production for billing. This solution needed to have the flexibility to accommodate many different sensor types including thermistors, 4-20mA current loops, voltage from pyranometers, and pulse signals from the flow meters and energy meter. The logger also needed the ability to save historical data to an offsite location and also to capture near real-time data snapshots for periodic monitoring during the day.

A **dataTaker DT80 Intelligent Universal Input Data Logger** was installed in the solar hot water system as the main controller. 9 thermistor sensors were then connected to the datalogger to provide highly accurate temperature measurements at different points in the system including the solar collectors' inlet and outlet, the heat exchanger inlet and outlet, and the hot water storage tank. Flow meters with 4-20 mA outputs provided data on the various flow rates within the system including the solar loop, the heat exchanger loop, and the storage tank outlet. The pyranometer provided information on the level of incident sunlight. The DT80's digital outputs were connected to relays controlling the contactors for the different circulating pumps such as the solar loop pump, the heat exchanger pump, and the rejection pump, which dumped excess energy to a radiator if the incoming solar energy exceeded what could be used or stored. Finally, a counter input was used to capture data from a certified meter that determined how much energy the system produced.

A major part of the project involved designing the logic and control routines for the system. The dataTaker data logger monitored the temperature differential across the solar panel to determine if there was an adequate net temperature gain, and if so, it would direct the system to send hot water to the storage tank and then sent into the rest of the system. If the temperature in the storage tank became too high, the logger would switch on the rejection pump to dump the excess energy back into the atmosphere.

To facilitate data accessibility to remote locations, the FTP capabilities of the datalogger were used to periodically "push" the data to a server located in the installer's office. The data was uploaded in 2 formats, a full data set for archiving and detailed analysis, and a decimated data set consisting of every 10^{th} data point uploaded at more frequent intervals providing near real-time monitoring. Furthermore,

this data was sent in formats which allowed quick parsing out of the various values and presentation through a monitoring website.

The company's installation has been successful. In particular, the installer liked the DT80's versatility to capture many different physical values including thermistors, 4-20mA current loops, voltage from pyranometers, and pulse signals from the flow meters and energy meter. The intelligent data logger also provided an number of options for future enhancements including expanding the number of inputs with dataTaker CEM20 modules to handle larger systems; the built in web server to provide real-time updates directly from the logger; and a serial interface to allow direct connection to the energy meter to capture additional data or to an HMI for a local operator or service technician.

For more information on the dataTaker DT80 Intelligent Universal data logger, other dataloggers in the highly successful dataTaker line, or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Applications Specialist at (800) 956-4437 or visit the website at www.DataLoggerInc.com.

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