



Off-Peak Water Pump Control Using the SEL-2411 PAC

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INTRODUCTION

Water storage reservoirs provide customers with uninterrupted service without the need for continuous pumping. Electrical rates in certain regions of the country are structured to discourage use during certain times of the day, making the time of pump operation an important economic factor in the control of pumping systems. The SEL-2411 Programmable Automation Controller (PAC) uses historical and predictive calculations to optimize pumping cycles, thereby shifting water pumping from on-peak electrical rate structures to lower-priced tier periods.

PROBLEM

Peak water demand often coincides with peak electrical demand. This results in large electrical usage by water producers during the most expensive electrical rate schedules. Many systems have unintelligent mechanical controls that cannot shift water demand to off-peak electrical rates or calculate the optimal pumping schedule for maximum electrical savings.

SEL SOLUTION

The SEL-2411 microprocessor-based controller provides cost savings to water purveyors with tiered electrical rates by efficient pump and water storage utilization. Adding an SEL-2401 Satellite-Synchronized Clock ensures adherence to strict rate structures.

The SEL-2411 has flexible I/O and low power options available to maintain uninterrupted control and communications with backup battery power. With an operating temperature range of -40° to $+85^{\circ}\text{C}$, conformal coating on all circuit boards, and a ten-year warranty, the SEL-2411 is suited for the harshest of environments.

PRINCIPLE OF OPERATION

Shifting on-peak pumping to mid-peak and off-peak time and rate periods can provide significant savings by optimizing reservoir capacity through intelligent pump control. By having the reservoir as full as possible prior to on-peak electrical rates, the amount of pumping necessary during peak rate periods may be reduced or eliminated. The only requirements for most applications are an analog reservoir level and pump run signal.

The SEL-2411 establishes historical values of reservoir levels just prior to peak electrical rates, using them to establish a pattern. By calculating tank volume, pump output, and the rate of drain, an optimal time to start the pump(s) prior to on-peak demand can be determined to “top off” the reservoir just prior to rate increases.

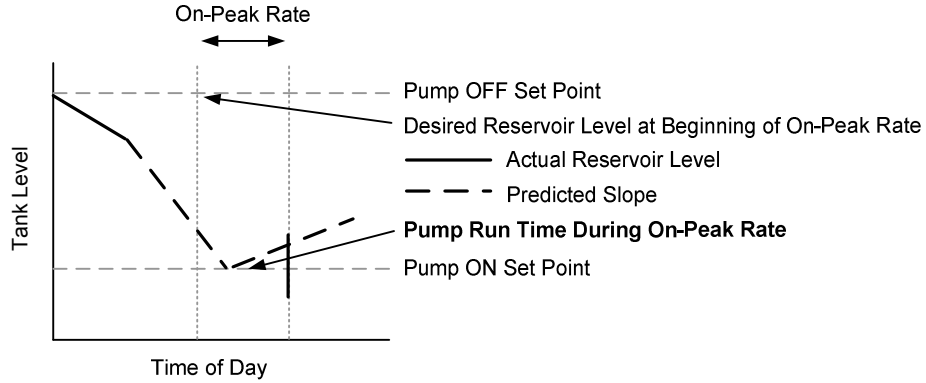


Figure 1 Normal Operation Using Set Points

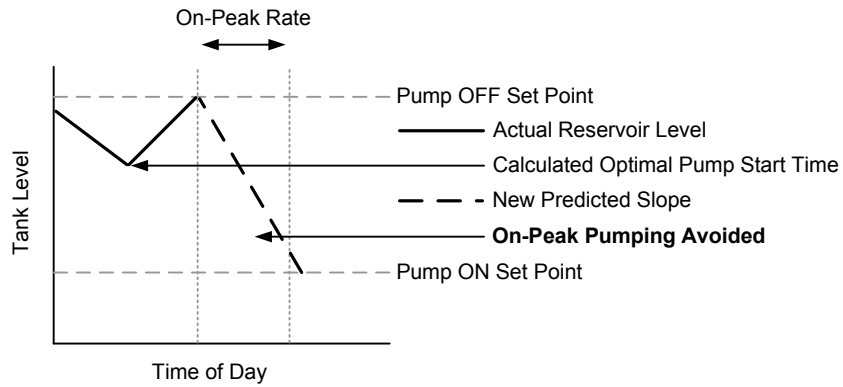


Figure 2 Operations With SEL-2411 Off-Peak Pump Optimization