

Sure Bet Program

Offered By: NV Energy
Administered By: KEMA Services, Inc.

Variable Frequency Drive on a Swimming Pool Pump Saves Electric Costs at Park Avenue Condos

Richard Hainsworth, Maintenance Manager at Park Avenue Condos had a problem. His swimming pool pumps were loud and inefficient, resulted in unhappy pool users and high electricity costs to the Condo Association. He contacted his pool service company to consider alternative solutions. After a brief investigation they found that the existing pump filters and piping had high-pressure-drops and excessive flow rates. Mr. Hair of Adam's Pools recommended changing the filter system and he also recommended a variable speed drive on the pump motor that allowed Mr. Hainsworth to vary the flow to the needed flow rates. With help from a Sure Bet Incentive from NV Energy, the project had a payback period in less than 5 years.

The old pump system consisted of two 5- HP pumps, both of which operated at nearly full power 7 days a week, 365 days a year. The flow in the circulating system was constant and required manual adjustment using a gate valve. The new system consisted of new piping, filters, and a new 7.5-HP pump with a programmable variable-frequency drive (VFD). The new drive allows precise flow adjustment by "dialing in" the pump motor speed. The VFD was programmed for full flow during and after the hours that the pool was occupied and for partial flow during summer nights and during the winter months when the pool is not used.

With assistance from Sure Bet program staff, Mr. Hair calculated the electricity savings to be nearly 54,000 kWh per year. This resulted in electricity cost savings of about \$5,000 per year and earned a rebate of \$2,915 from the NV Energy Sure Bet program. To verify the reduction in pump power, Sure Bet staff worked with Mr. Hainsworth to measure the pump power as he decreased the (pump speed (and flow) in 10% intervals. See Figure 1 for the results.

The circulation pump power decreased at nearly the SQUARE of the reduction in pump speed (for example, when the flow is reduced by 20 percent through reducing the pump speed from full speed to 80% of full speed; the pump input POWER (in Watts) is reduced to 68% of the power at full flow (68% is slightly greater than 0.8 squared).

The bottom line is that variable speed drives can save a significant amount of energy in pumping systems when flow requirements vary. They provide an easy way to throttle flow and may help to solve other problems like excessive noise. VFDs have been applied successfully to other pumping systems like spas, aquariums, and water features in Las Vegas.

Project Overview

Pool Pump VFD Project Summary		
Annual Savings	54,000	kWh
Annual Savings	\$ 5,670	
Cost *	\$ 23,989	
Sure Bet incentive	\$ 2,915	
Simple Payback	3.7	years

VFDs can be applied in a custom design or they are also offered in a “packaged” configuration with integrated entrapment protection system that is required under the Virginia graham Baker Act.

% Speed Setting (from VFD Panel)	Pump RPM (from VFD)	Gallons per Minute (from flow meter on pipe)	Amps (3 phase at 230 volts)	Pump kW	Percent of Pump Full RPM	Percent full Flow	Percent of Full Power	% Spd ^{1.8}
100%	3490	350	18.7	6.33	100%	100%	100%	
90%	3140	300	15.6	5.28	90%	86%	83%	83%
80%	2790	275	12.7	4.30	80%	79%	68%	68%
70%	2440	225	10.1	3.42	70%	64%	54%	53%
60%	2090	200	8.1	2.74	60%	57%	43%	41%
50%	1740	175	6.5	2.20	50%	50%	35%	30%
40%	1490	125	5.6	1.90	43%	36%	30%	23%

