Success Story:
QuantumFlo, Inc.

Markets Served
OEM Pumping Systems

"QuantumFlo recognized the advantages of M-Max; its ability to provide both a pump control solution and a complete control solution in a compact package. Most systems with this complexity rely on a control panel with a PLC to execute the required logic. The M-Max brings this logic into itself and eliminates the panel entirely with the IP21 conduit kit."

QuantumFlo CEO David Carrier

QuantumFlo
an exponential leap in technology

Location:
DeBary, FL

Problem:
Existing drive solution was not accurate enough to provide desired results; also was not offered with conduit fittings

Solution:
The more accurate Eaton M-Max drive with IP21 conduit kit allowed QuantumFlo to meet their energy and functionality needs while eliminating the PLC and control panel for logic.

Contact Information

Readers who may have similar application challenges and would like to discuss this success are invited to call Josh Gross at 407-217-4515.

The Eaton M-Max VFD provides QuantumFlo with a cost-effective, energy efficient solution

Innovative Variable Speed Booster Pump Solution Provides Significant Energy Savings

Achieving consistent water pressure is a challenge for geographical areas that have grown faster than the development of infrastructures to accommodate water demand and for businesses such as fast food restaurants and strip malls. Recognizing the residential and light commercial markets' need for an energy saving booster pump solution to deliver reliable water pressure, QuantumFlo, DeBary, FL, used its variable speed pump expertise to develop a "pump in a box" solution that detects low flow conditions accurately and enables users to achieve significant energy savings.

Variable speed saves energy

Although constant speed pressure boosters are available, their inefficiency makes them a less than desirable option. With a constant speed drive, every time the system comes on at full speed, it runs for a time delay and then turns off. As a result, it is at full speed and full capacity the entire time it is running.

In contrast, the variable frequency drive (VFD) solution only runs for the specific capacity and energy required to meet the need at that instant.

As the speed of the pump is reduced, the energy is reduced by the cube of the speed reduction. Every reduction in speed below full speed reduces the energy by a factor of eight. In addition, variable speed boosters are also quieter and maintain smooth pressure throughout the facility or residence.

QuantumFlo CEO David Carrier explains, "The effective use of energy is best served with variable speed drives particularly in transporting and generating water pressure. There are very few devices in a commercial structure that run almost constantly. Eighty percent of the time a typical water booster system is using 20 percent capacity or less. If it's running 80 percent of the time at full speed, for 20 percent of the load, that's a huge amount of waste. In contrast, if it is running 80 percent of the time at 20 percent load, its energy is being reduced by the cube of the speed reduction, which is massive. As a result, when considering the energy reduction over time, it's very significant even on a very small unit."

Booster development

QuantumFlo's Application Engineer Robert Mann explains, "When we began developing our Atom™ Simplex Light Commercial/Residential pressure booster our goal was to provide a fully contained, fully assembled solution by putting together a motor, pump, bladder tank, and a VFD. Once it was fully plumbed, wired and tested, we put a few units in the field.

"It wasn't long before we learned that the VFD we used did not have the accuracy to detect lower flow conditions. Customers also reported that while the exposed wiring did not present a safety hazard in itself, code inspectors did look upon it unfavorably. Considering the potential impact of those two issues on our customers,

EATON
Powering Business Worldwide

we immediately revisited the unit's design."

Improving accuracy and safety

As QuantumFlo investigated alternatives that would eliminate the accuracy problem and exposed wiring issue, it learned about the capabilities of Eaton's M-Max variable frequency drive and the fact that the company, unlike its current drive supplier, could provide an IP21 conduit kit to contain all the wiring.

Mann reports, "The M-Max gave us the ability to provide both a pump control solution and a complete control solution in a compact package. Most systems with this complexity rely on a control panel with a PLC to execute the required logic. Since the drive has built in intelligence it performs all on/off operational calculations, soft start and stop and regulates the pressure of the system. Accomplishing all of that using a PLC would require complex wiring, an added enclosure and result in a unit with a larger footprint. Plus the PLC alternative would cost at least 50 percent more. The M-Max brings this logic into itself, which eliminates the panel entirely. In addition the IP21 conduit kit provides a very streamlined, clean installation."

Each Atom booster pump system has a 0-10V pressure transducer that monitors the system's water pressure at all times. The booster system uses the zero analog input detection feature to alarm the system if the pressure transducer fails or loses signal or senses low suction pressure. If the system goes under 1.5V (15 psi) for 5 seconds or .25V (2.5 psi) for 0.5 seconds the VFD goes into an alarm state. Since the VFD QuantumFlo used originally did not have this feature, the user had to wire in several jumpers and use advanced non-standard programming features to get the VFD to function in this manner.

In addition, every booster pump system is designed to maintain a particular water pressure using PID control. However, since water demand is constantly changing in residential and commercial buildings, it is common for the VFD to run at very slow speeds to maintain the target pressure. The M-Max's sleep-mode is based upon frequency output (Hz) of the VFD. If the demand falls below a certain level, and the VFD drops below a set frequency, the system will go into sleep-mode. This conserves energy and extends the life of the system. While the earlier drive the company used has a similar feature, it is far more complex to implement.

Mann adds, "The sensitivity of the M-Max gives us a variety of options that we can choose to optimize the way the drive detects low flow. In addition to the Eaton capabilities, the EatonCare VFD team has the ability to help program and tune the PID control, sleep-mode and zero analog input detection enabled us to make the transition to the new drive quickly."

Since the M-Max screen provides a clear alarm code, a customer only needs to make a phone call, report what the code is and QuantumFlo personnel can help resolve the problem quickly. Additionally, if the Atom's parameters need to be changed to accommodate a change in the customer's needs, QuantumFlo can guide the user through the process in a matter of minutes.

Ideal solution

With the Atom's ability to cover all voltages and all phases of power availability, it can provide an effective, economical booster solution to strip malls, restaurants, as well as residential users. Currently, it is being used by customers like an international fast food chain's Las Vegas location that has 460 volt three phase power as well as residential customers in Hawaii that only have 115 volt power available because of their location far from the local power distribution network.

Carrier adds, "QuantumFlo recognized that the marketplace needed a cost effective booster pump system and leveraged the capabilities and flexibility that the M-Max provides to develop a competitive solution that delivers energy savings as well as reliable water pressure."

Eaton Corporation
Electrical Sector
1111 Superior Ave.
Cleveland, OH 44114
United States
877-ETN-CARE (877-386-2273)
Eaton.com

Printed in USA
Publication No. CS04009001E/MZ728
March 2012

Powering Business Worldwide