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Custom Controls & Automation

CASE STUDY

System:	Water Booster Pump
Application:	High Rise Apartment Complex
Customer Objective	Ensure consistent water pressure across each floor
Key Components:	Danfoss FC-202 Aqua VFD's, Siemens CFSH Disconnects, Mersen USCC Fusing, Hammond EN4SD Nema 4 Enclosure.



Figure 1: Initial Design

Problem Definition:

Walker Panels was approached by a company whose focus was integrating and retrofitting water booster pump systems into high-rise apartment buildings. The problem they were seeking to resolve was inconsistent water pressure. Their existing control panel system required ongoing maintenance and access to VFD programming menus were kept confidential by the manufacturer. This prevented the customer from controlling and optimizing the system. Walker Panels was tasked with designing and building new control panels that would operate the existing pump systems and deliver consistent water pressure.

Investigation:

Upon investigation we found that none of the existing control panels were either CSA certified, or ESA inspected and therefore not legal for electrical use in Ontario. Complete drawing packages were not provided with the panel and substandard (non-certified) components were used. The Variable Frequency Drives (VFD's) also were more suited for HVAC units and not water movement. We therefore determined that substandard parts, poor programming, and the wrong VFD's were the root problem of the inconsistent water pressure.

Design:

With Walker Panels dedicated team, an updated control panel using CSA certified components was designed with a similar look and feel and reflecting portions of the original system. Calculations for the number of floors and units in each building also had to be factored into the equation. After a thorough review and analysis, Danfoss Aqua Drives were chosen for water movement, Hammond Nema 4 for the enclosure because of potential damp conditions, Mersen fusing for component protection and Siemens disconnect switches for their quality and reliability. Our goal was to design and build a quality finished control panel certified for use within North America.

Implementation:

As the Aqua drives were key to the success of this project, we arranged a meeting with the customer and DanFoss at our facility to ensure the customer was fully knowledgeable about the system prior to the onset of production. Once the proposed design was approved by the customer, all necessary components were purchased, and the initial model was put into production (Figure 1).

Upon completion the panel was CSA inspected in-house and approved. Following the shipment to the customer, training was provided by the VFD manufacturer for the customer to ensure they had knowledge of the programming and could make changes, as necessary. Over the following week Walker Panel's was on site with the customer to assist in a full simulated set up prior to official installation.



Figure 2: Modified Horizontal Design

End Result:

The new DanFoss Aqua Drives were configured within the control panel as Primary and Secondary Drives. This allowed one drive to always be operational and as required, the Secondary Drive would automatically cycle on demand. This step achieved the main goal our customer presented to us of maintaining consistent water pressure throughout every floor of the complex. During the first four months of production a total of eight control panels were built using the original layout, all for individual apartment complexes. Following that, our customer then inquired about changing to a new design for other locations. This newest design changed the vertical layout of the pump system on a galvanized backplate to a horizontal layout (Figure 2) on stainless steel. The result was a smaller overall footprint that allowed for easier installation and maintenance. In conjunction with our in-house CSA Certification Testing Process, the DanFoss Aqua VFD's were also programmed to pre-determined settings as provided by our customer. For the final stage of the journey Walker Panels Lead Hand in production, who is also a 309A Electrician, became part of the team completing installations onsite of the new Water Booster Pump Systems> Due to the efficiency of this team effort by both our customer and Walker Panels, old pump systems were removed, and new systems installed within hours.

To date over 30 of these systems are operational throughout the Greater Toronto Area. Sizes of the systems ranged from 1.5HP to 15 HP, 1 to 3 Pumps, and voltages of 208,460,575.

