Linear flow control from a non-linear valve

Photograph shows SIPOS 5 actuators controlling 16" ball valves at the Kiva Pump Station, Albuquerque, New Mexico, US. The actuators provide linear flow control for smooth pumping operations.

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Application

Expanding station capacity while lowering transients

Kiva Pumping Station, located in Albuquerque, New Mexico, is connected to an existing part of the water supply system, but has experienced growing demand and must significantly increase capacity.

Design Challenge

Linear flow control with smooth pumping operation

The valve/actuator system must manage water surges during pump start-up and shut-down and provide linear water flow control during normal operation.

Solution

SIPOS 5 with time / valve position control

Valve operation and avoidance of water hammer has been achieved using SIPOS 5 variable speed control actuators. Pipestone Equipment and Alpha Southwest developed an optimized solution which has significantly increased station capacity by 276%. This has been achieved within the existing historical brick pumping station while minimizing system transients caused by the higher flow rates.

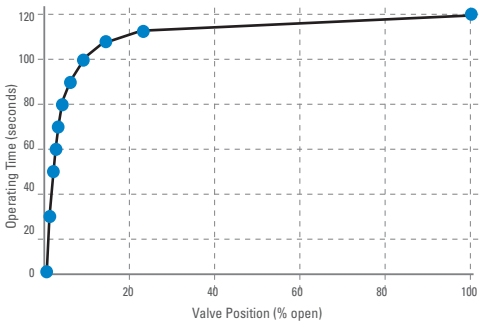
Detailed hydraulic modelling was required to determine the exact valve control timing scheme in order to programme the actuator for minimal system transients. Linear flow control has been achieved using the actuator's time set capability allowing 10 different set times corresponding to 10 valve open positions. In addition, the provision of an electrical UPS allows the valve to be closed to protect the pump in the event of power failure.

"Full port" ball valves have been used for pump control because of their high flow capacities (Cv) and almost zero head loss when open. This minimizes pumping costs and electrical energy consumption.

Technical Data

Location: Albuquerque, New Mexico

Pump control valve operating time characteristics



Function Profile

The SIPOS 5 actuator has the unique capability to control valve position based on preset times. Up to ten time set points, with corresponding valve positions, can be programmed. The speed of valve opening or closing is then controlled ensuring that the desired set position is achieved at the correct time.

This advanced flexibility can produce linearization of valve characteristics, allowing full port valve selection and / or significantly reduced water hammer when closing valves. In addition, the use of advanced electrical design incorporating inverter technology allows the use of simple single phase UPS supplies to control the valve in event of power failure.

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