



## **PRECISION ELECTRIC CONTROL VALVES**



# Control Systems

## Time-Duration Control System

Precision electric valves set up for time duration operation are built to provide a choice of running times for full scale plug travel – nominally 2.5 and 6 minutes. As an open-loop system, the valve moves at synchronous speed in either direction for as long as power is applied. The degree of precision is determined by the length of on-time signal (duration) and the designed full-stroke run time. The minimum on-time duration recommended is 50 milliseconds. For example, a DeZURIK 60 hz motor with a run time of 388 seconds may provide 7760 positions from fully closed to fully open. The advantage of the time-duration system is it can be programmed to accept signals from 50 milliseconds to total run time of the valve, according to the needs of the process loop.

## 12-bit Position-Feedback Control System

The optional resolver provides a very high resolution 4-20 mA signal to a process control computer. Using this as a means of control, 4,000 repeatable valve positions can be achieved. As an open loop system, the valve moves at synchronous speed as long as power is applied. A process computer control algorithm can manage run time power signals as short as 50 milliseconds to move the control valve to a specific position – based on a resolver position feedback signal. Such a control system works in conjunction with a standard Time Duration Control Station. It requires that the valve's time duration run-time be set for a nominal value of 6 minutes. This resolver provides a clean, high signal-to-noise ratio allowing process control systems to scale up the position signal without concern for error.

## Analog Control System

Analog control uses a closed loop system with electronic valve position feedback to a differential amplifier/controller located in an Analog Control Station. When a 4-20 mA valve-control signal is sent to the Analog Control station, a difference between the input and valve-position signals will cause power to be directed to the drive motor, causing the valve to move in the required direction. System limitations are determined by control-signal noise and sensitivity of the differential amplifier/controller.

Valve positioning accuracy is typically within 0.1%, providing 1000 repeatable valve positions within full-scale valve signal. Position feedback is with a potentiometer.





# **Motors and Accessories**

## **Drive Motors**

All Precision Electric Valves employ AC synchronous motors which run at constant speed when powered. The motor starts within 1.5 cycles of applied frequency and stops within 5 degrees of motor rotation, ensuring instant response and positioning accuracy.

These can be permanently stalled without overheating or harmful effects on the components. Permanent magnets in the rotor provide brushless operation and provide residual torque for holding the valve plug in position when the power to the motor is off.

The key to this high degree of precision is the harmonic drive. It provides positive, undetectable backlash between the drive module and the valve plug. The elliptical tooth path and slight deflection of the teeth produce a preload between driving and driven components resulting in no relative motion between teeth at the points where torque is being transferred. With 10 % of teeth engaged at all times, the effect of tooth-to-tooth error is reduced to the point that backlash cannot be detected at the mesh.

## **Switches and Potentiometers**

As standard, all Precision Electric Valves are furnished with one set of open and closed position limit switches and dual 1000 ohm potentiometers. Two additional switches are available for remote indication of travel. Two additional 1000 ohm potentiometers are also available.

## **Control Stations**

DeZURIK offers two styles of control stations; a vertical totally enclosed and a horizontal rack-mounted model. These stations provide a 3 digit valve position display, an on-off switch to immobilize the valve, a manual-automatic operation selector switch and push-button switches for manual operation. They are offered in Time Duration or Analog mode. The Analog Station incorporates an integral servo-amplifier (differential error amplifier) to operate the valve in response to input signals and valve position signals. The vertical model is fully weather proof and can be installed in a wet environment. The rack-mounted model is designed to be incorporated into standard control room systems mountings.

## Two Valve Plug Styles

The Precision Electric Valve is available with two trim packages, a V-Port and a Straight Concentric configuration. The V-Port plug provides an equal percentage characteristic and is designed for operation in paper/pulp stock and/or other fiber suspensions. The Straight Concentric plug offers higher flow capacity, a more linear flow characteristic and is designed for use in very low consistency fiber suspensions or clean liquid/gas fluids.

## Stainless Steel Construction

The valve body, plug, bonnet and packing gland, as standard, are 316 stainless steel, ASTM A743, CF-8M.

## NEMA IV Control Module

The control module cover provides NEMA IV protection and is easily removed for service and/or inspection. The components ride in precision bronze bushings. The entire control module can be stocked as a factory-calibrated unit. A spring-loaded v-ring PTFE seal protects control module components from flowing media.

## Continuous, Smooth Operation

The plug does not contact the seat or valve body, providing continuous, smooth operation. High compression pure-carbon bearings are chemically inert and support the valve plug and drive train in three locations. They are designed to provide decades of smooth trouble free operation.

## Manual Operation

A fail-safe interlock switch interrupts the motor circuit when the end cover is removed for manual operation. A manual thumb-wheel incorporating a slip-clutch allows adjustment of the motor back shaft for accurate valve positioning, should there be power or signal failure. The integral slip-clutch protects the integrity of drive components by preventing excessive torque being applied.



## External Valve Position Indicator

An external mechanical dial and pointer provide visual indication of valve plug position.

## Unmatched Control Accuracy

The DeZURIK Precision Electric Control Valve is designed specifically for critical basis weight and head box control applications, as well as other critical control applications where high resolution is required. Control system options provide positioning accuracy from 1000 to over 7000 positions. DeZURIK can provide one analog and two time duration control systems.

## Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:

Web Site: [www.dezurik.com](http://www.dezurik.com) E-Mail: [info@dezurik.com](mailto:info@dezurik.com)



250 Riverside Ave. N. Sartell, Minnesota 56377 • Phone: 320-259-2000 • Fax: 320-259-2227

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