KOSO AMERICA
4 Manley Street
W. Bridgewater, MA 02379
Tel: 508.584.1199
Fax: 508.584.2525

RESOLUTION AND POSITIONING

RESOLUTION

THE STROKE PARAMETERS INPUT into the controller during the calibration procedure will define a set of ideal target positions for the control signal. The deadband setting is a plus or minus range around these ideal target positions. If the actual position exceeds the ideal position by more than the deadband, then the controller will reposition the unit. The new position will reflect the ideal position plus or minus the deadband.

For instance, on a typical 4-20 mA control range, a 12.00 mA signal and a deadband setting of 0.1% would position the actuator between 49.9% and 50.1%. The actual position within that window would depend upon the direction of motion, speed and acceleration. A unit stopping at the 50.05% position would require a signal increase of 0.03 mA or 0.15% before repositioning. Conversely, a decrease in signal of only 0.01 mA or 0.05% would be needed before motion.

A series of 0.1% signal changes with a deadband of 0.1% does not guarantee continuous position changes. There will be some signal changes where the ideal position does not exceed the deadband window of the actual position. A 0.05% setting of the deadband would be required to produce continuous signal step changes of 0.1%. Usually, a deadband setting of 0.1% below the minimum signal step change is required to produce a continuous response.

The REXA **Xpac** utilizes 12 bit processing to determine the actual position. The analog reading from the feedback is broken into 4000 parts. For 0.1% or greater resolution setting, four bits determine a position. This procedure along with other digital averaging is used in noise control and cancellation. The 0.05% deadband only uses two bits for the position. The trade-off for the improved resolution is the potential for greater noise. Additional electrical shielding may be required on the feedback cable.

POSITIONING

Movement of an actuator does not insure a change in the controlled variable. The stiffness of the connecting shaft and the static and dynamic loads on the driven device play an important role in determining whether an actual change occurs.

An actuator that exhibits 20000 step changes for 90° rotation on a control valve may theoretically exist, but that does not result in 20000 different repeatable flow rates. Many actuator step changes will only increase tension in the connecting shaft. Until the torque in the shaft exceeds the static load on the valve plug, there will be no motion. When the shaft finally does move, the load (dynamic) will reduce resulting in an indeterminate rotation. A direction reversal only exacerbates this action.

Typically, a rotary ball or plug valve presents the worse case of this phenomenon. Torsional stiffness of the shaft is low, required torque is high and there can be a large difference between dynamic and static friction. For fine control, a linear valve presents the stiffest mechanical connection.