



Non-Contact Position Monitoring for Linear Control Valves

EPIC® 420

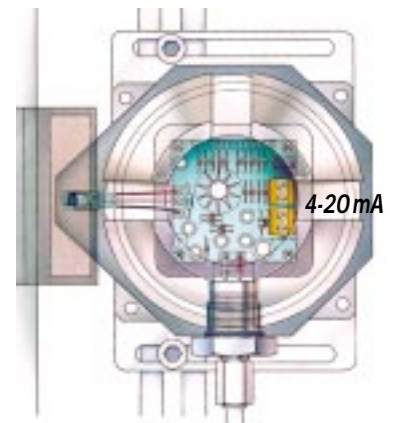
Nonincendive / Explosionproof

Non-Contact Position Transmitter

The EPIC® non-contact position transmitter represents a significant departure from previous attempts to reliably measure stem position of linear control valves. As opposed to conventional devices, no linkages, levers, rotary or linear seals are utilized. A static slide-by actuation assembly, attached to the valve stem, is the only "moving" part in the entire transmitter. Sensing is performed totally by non-contacting means, based upon characterization of flux strength as a function of axial position.

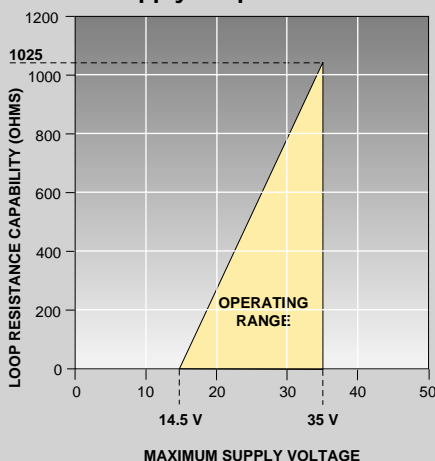
A solid state sensor is employed, whose output is a function of both flux density and excitation voltage. That property allows the use of an internal bridge circuit for highly accurate zero adjustment, where one arm of the bridge is comprised of the sensor, and the other comprised of a resistive divider for zero reference.

Transmitter output is 4-20 mA, 2 wire, with compliance voltage ranging from 14.5 to 35 volts. Output updating takes place 20 times per second, allowing use of the transmitter for applications heretofore not possible with transmitters of other types. The inherent reliability of the transmitter permits use of advanced control strategies, where knowledge of valve position can be used in predictive and other algorithms.



Technical Specifications

Power Supply Requirements



Output	4 to 20 mA nominal, proportional to stem position.
Terminal Voltage Req.	14.5 to 35 Volts DC, Reverse polarity protected.
Linearity	± 1% maximum deviation from straight line.
Span Adjustment	0.5" to 1.25" stroke, continuously adjustable. Longer strokes available upon request.
Zero Adjustment	± 30% of calibration span, considered centered when magnet travel range is centered on valve stroke range. Continuously adjustable.
Resolution	Infinite.
Hysteresis	Negligible.
Temperature Range	-20°F to 185°F.
Temperature Effect	Less than .01% / °F, combined zero and span effect, at full span.
Humidity	10% to 90%, non-condensing.
Voltage Effect	Less than 0.1% for any voltage within the range of 14.5 to 35 volts.
Reverse Polarity	Protected from damage by internal diode.
Mounting Attitude	Any position.
Output Update Rate	Nominally 20 times per second.
Startup Stabilization	Within 4 seconds of power application.

*NOTE: For linear graphs displaying deviation from straight line (0.4" to 20") see technical manual #374

EPIC® 420



Predictive Diagnostics

EPIC® provides operating personnel the capability of bringing a higher degree of intelligence to the final control element. On-board electronics allow remote monitoring and diagnostics that continuously monitor control valve positioning performance, allowing comparison with the ideal. Reporting of deviations affords plant personnel the ability to detect problems before they become serious enough to trigger an alarm or shutdown.

Need For Diagnostic Capability

In terms of diagnostics, one of the most common problems in control valves is a form of "stickiness" developing in the packing or guide bushings.

In addition, most pneumatic actuators do not provide infinite positioning "stiffness". That is, a sudden decrease of force required to stroke the valve will cause the actuator to stroke further than intended with the actuator air signal held constant.

In practice, the mass of actuator and valve moving parts is low enough that a rapid "jump" in position will occur due to the fall in friction at the onset of stroking. The "jump" is rapid enough that the positioner cannot correct quickly enough to prevent the resulting overshoot.

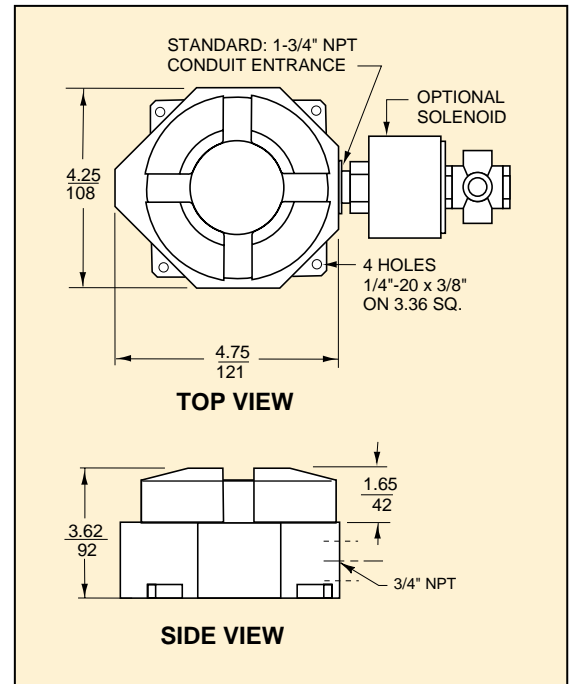
As age, wear, and other factors take their toll, the "jump" effect often becomes more pronounced. The resulting overshoot may become severe enough that the positioner continually tries to correct the situation, resulting in a constant "hunting" condition.

Early Detection and Diagnostics

With proper signal processing, the EPIC transmitter is ideal for detecting the onset of such effects. Early diagnosis allows maintenance or other corrective action to be scheduled; therefore avoiding a severe problem. The key in detection lies in determination of maximum rate of position change, or alternatively, in a comparison between rate of change of position signal and the actual position change of the valve.

Rate of valve position change may be determined by taking EPIC transmitter readings at finite intervals, perhaps once per second. The change in position during each interval may be compared with a maximum allowable value. In essence, the technique described here amounts to taking a first time derivative of position by numerical means.

DIMENSIONS (inches/mm)



MATERIALS OF CONSTRUCTION

Housing	Aluminium
Cover	Aluminium

APPROVALS / CERTIFICATION

UL (Underwriters Laboratories, Inc.)
CSA (Canadian Standards Association)

AREA CLASSIFICATIONS

Nema 4, 4x, 7, 9
Class I, Groups B, C, D
Class II, Groups E, F, G, Divisions 1 & 2
Class I, Group A, Division 2

ORDERING GUIDE

EPIC®

420

Aluminum:

Class I, Groups B, C & D

Class II, Groups E, F & G, Div. 1 & 2

Class I, Group A, Div. 2

