

# Valve Position Sensing - Digital

Verify valve position and facilitate closed-loop control

## Introduction

Position sensing is offered on all models of Acro Associate's pinch valves. Position sensing supplies electronic feedback on a valve's position (or state). This feedback confirms that a valve is in the state dictated by a control input. A key benefit to position sensing is that it facilitates closed-loop control. This allows monitoring of valve function for critical applications. Another benefit is that other devices in a system may be triggered based on a valve changing state.

## Classification by Output Signal

Depending on their output signal, position sensors are classified in one of two ways: analog or digital. An analog sensor outputs a variable voltage signal that changes with valve position. It is possible to detect several valve positions throughout the stroke of the valve. A digital sensor outputs only two states (OPEN or CLOSED). The decision to use an analog or digital sensor depends on the application, the manner in which the feedback will be processed, and the accuracy required of the feedback. This paper details digital output sensors. For analog output sensors, see "Valve Position Sensing – Analog".

A digital sensor will switch from high voltage to low (or from ON to OFF) as the valve moves from CLOSED to OPEN state, with the switch point usually occurring in the last 10-25% of the valve's stroke (the switch point is adjustable and is set at the factory). Standard output type is sinking.

## Classification by Sensor Type

Acro Associates offers two types of digital sensors: Hall Effect Sensors and Micro-Switches.

A **Digital Hall Effect Sensor**, or **Digital Hall Sensor**, senses the strength of a magnetic field and changes state when moved into the field. The magnetic field is generated by a permanent magnet incorporated within the actuator, or by the magnet field created by the solenoid. As the valve changes state, the permanent magnet (or field) travels toward or away from the stationary Hall sensor.

**Micro-Switches** are also considered digital, as they have only two states; OPEN or CLOSED (ON or OFF). They are actuated by movement of a lever or button which is integrated into the switch. Metallic contacts within the switch, come together to change its state. Acro utilizes a switch rod, which is attached to a moving component of the actuator and depresses the switch lever as the valve opens.

## Mounting

Acro's position sensors require special mounting as they must interface with a mechanical or magnetic component of the actuator. Acro has three mounting types for digital position sensors. They are: Integrated (internal magnet), Dashpot (external magnet) and Switch Boss (internal rod).

**Integrated (internal magnet)** includes models with a permanent magnet attached to a moving component within the actuator, or having a magnetic field created by the solenoid and passed through a moving component. Sensors on these units are integrated into the valve body or low profile and rear mounted.

**Dashpot (external magnet)** includes models with a permanent magnet attached to a moving component outside the actuator. Frequently used in applications that also require sound dampening, the external magnet is attached to the piston of a dampening device called a dashpot. Sensors for these units are mounted onto the dashpot and add approximately 1 inch to the length of the valve.

**Switch Boss (internal rod)** includes models that incorporate a switch rod, which is attached to a moving component of the actuator and extend out the back end of the valve (opposite pinching end). Switches for these units are mounted onto a switch boss and add approximately 1 inch to the length of the valve.

## Wiring Connections and Power

Depending on the type of sensor selected (Digital Hall Sensor or Micro-Switch), wiring connections and power must be considered.

**Digital Hall Sensors** require a 3-wire interface: power, ground and output. These are typically driven with a Programmable Logic Controller (PLC), or other low power control signal. Power can be up to 30VDC and 30mA.

**Micro-Switches** require a 2-wire interface: power and ground. Switches are supplied with solder posts and can be set up for Normally Open (NO) or Normally Closed (NC) switching. These are typically driven with a power supply, and up to 30VDC and 500mA.

To learn more about position sensors or to discuss which position sensor would best suit your application, please contact an Acro Applications Engineer either by e-mail or at 1-800-672-2276.

## About Acro Associates

Acro Associates, Inc. is the leading innovator of high performance fluid control systems. Our designs maximize reliability and repeatability of fluid control in medical devices and bio-processing equipment. Our dedication to meeting customers' needs is unsurpassed.

We offer products and services that can utilize any selected portion or the full range of our capabilities— from engineering design, prototyping and pilot production to full-scale production manufacturing and quality control. In addition, we also offer fully customized solutions tailored to individual customer requirements.

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