

INDUSTRIAL, MEDICAL AND TRANSPORTATION APPLICATIONS

Application Note

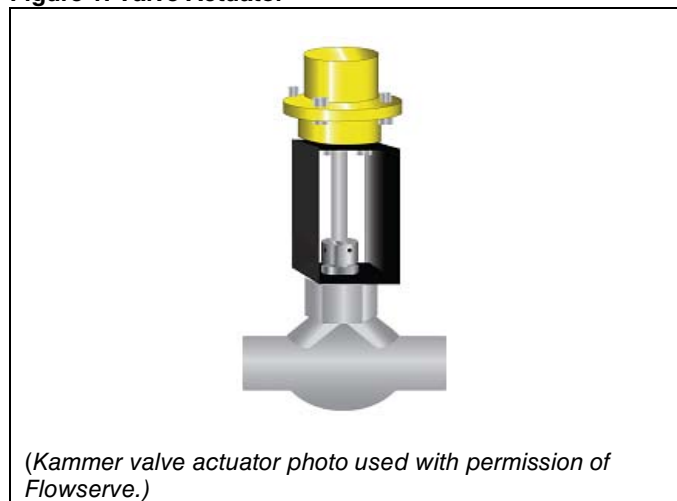
Sensors and Switches Used in Valve Actuators and Valve Positioners

BACKGROUND

Valve Actuator

- **Description:** A valve actuator (See Figure 1) is a pneumatic or electric mechanism used in process control systems to automatically open or close valves. In standard valves, when the valve is given a command to open to a certain point, there is no feedback to verify that it has opened to that position.
- **Potential Applications:** Valve actuators can be used with either linear or rotary valves in industrial, medical, food and beverage, and transportation applications.

Figure 1. Valve Actuator



Valve Positioner

- **Description:** A valve positioner (see Figure 2) is used in combination with a valve actuator to significantly increase accuracy by measuring actual valve position against the set point value and pneumatically correcting the valve position until the difference between the set point and actual position is 0 (or some allowed tolerance). The use of a valve actuator alone may not accurately position the valve due to imprecise calibration, differential pressure across the valve (pressure drop causes valve lift), valve wear or other reasons. A valve positioner can be used for precise valve positioning based on a signal from a central control system. With a valve positioner, the command is given, the valve

positioner reads the opening, verifies position, and readjusts (if necessary) to the position needed. This allows for excellent precision in the valve adjustment.

A valve positioner's power source can be a manual gearbox or an electronic device with control and measuring devices. Valve positioners are available with hydraulic, pneumatic, and electric operating mechanics. Valve positioners help deliver precisely controlled valves, which allow facilities to achieve higher throughputs and higher product quality levels.

- **Potential Applications:** Valve positioners are used throughout the process industries including oil and gas, refining and petrochemicals, chemicals, power, pharmaceutical, food and beverage, pulp and paper, other processes, and pipelines.

Figure 2. Valve Positioner




SOLUTIONS

Honeywell offers a wide range of sensors and switches that monitor valve stem, actuator and wheel position, as well as measure diaphragm pressure. (See Figures 3 and 4.)

Sensors and Switches in Valve Actuators and Positioners

Figure 3: Potential Honeywell Products Used in Valve Actuators



1 Hazardous Location Position Sensor
XYR6000 OneWireless™ Series
Allows users to remotely monitor valve stem, actuator lever, or wheel position for improved productivity and safety, while reducing total installed cost in hazardous locations; part of a scalable ISA100 mesh network

2 Hazardous Area Limit Switch
MICRO SWITCH™ LSX/CX/BX/EX Series
Monitors valve stem, actuator lever, or wheel position, providing real-time position status for improved productivity and safety in hazardous locations

3 Wireless Limit Switch
Limitless™ Wireless Limit Series
Allows users to remotely monitor valve stem, actuator lever, or wheel position for improved productivity and safety, while reducing total installed cost with an economical wireless point-to-point solution

4 Limit Switch
MICRO SWITCH™ HDLS and GLS Series
Monitors valve stem, actuator lever, or wheel position, providing real-time position status for improved productivity and safety

5 Position Sensor
SMART Position Sensor, SPS Series 75 mm Linear
Monitors valve stem or actuator position

6 Stainless Steel Media Isolated Pressure Sensor or Pressure Switch
MLH Series Pressure Sensor or Series III/Series V Pressure Switch
Measures diaphragm pressure

Valve Actuator

- **Hazardous Location Position Sensor and Hazardous Location Limit Switch** (See Table 1.)
- **Wireless Limit Switch and Limit Switch** (See Table 2.)
- **Position Sensor, Stainless Steel Media Isolated Pressure Sensor and Pressure Switches** (See Table 3.)

Figure 4. Potential Honeywell Products Used in Valve Positioners



1 Silicon Pressure Sensor
TruStability® HSC Series and SSC Series or ASDX Series
Monitors positioner pressure

Valve Positioner

- **Silicon Pressure Sensor** (See Table 4.)

Sensors and Switches in Valve Actuators and Positioners

Table 1. MICRO SWITCH™ Hazardous Location Position Sensor and Limit Switches













XRY6000 OneWireless™ Hazardous Location Position Sensor	MICRO SWITCH™ LSX Series Hazardous Location Limit Switch	MICRO SWITCH™ CX Series Hazardous Location Limit Switch	MICRO SWITCH™ BX Series Hazardous Location Limit Switch	MICRO SWITCH™ EX Series Hazardous Location Limit Switch
				
Features and Benefits				
<ul style="list-style-type: none"> • Real-time measurement and quick information without wires – ideal for remote and hazardous locations • Installation and operation in minutes – remotely monitor from anywhere in the plant • Explosion-proof packaging of the sensor mechanism for reduced environmental risk • Rugged A380 die-cast aluminum alloy construction • Communicates up to 3000 ft • Up to ten years battery life, field replaceable 	<ul style="list-style-type: none"> • Completely sealed and explosion-proof for dangerous indoors or outdoors locations • Reliable, dependable and accurate • Positive-opening operation of normally closed contacts • Side rotary, plunger only actuators/levers 	<ul style="list-style-type: none"> • Explosion-proof for dangerous indoors or outdoors locations • Reliable, dependable and accurate • Positive-opening operation of normally closed contacts • Side rotary, side plunger, side roller, top rotary, top plunger, top roller plunger, wobble actuators/levers • 4 mA to 20 mA analog position version available 	<ul style="list-style-type: none"> • Sealed for protection against corrosion, water, dust and oil, and explosion-proof – ideal for outdoors locations or aggressive, caustic environments • Diverse conduit selection for a wide range of applications • Variety of heads and non-sparking actuators • Stainless steel version available (BX2) 	<ul style="list-style-type: none"> • Smallest UL-listed housings available for use in hazardous locations • ATEX, IEC Ex certified • Up to 20 A capacity • Ample wiring space • Mounts from four sides • Roller arms adjustable through 360° • Non-sparking actuators • Captive cover screws • Grounding screw • Flame paths within housing cool exploding gases below kindling temperature before they reach explosive gases surrounding housing

Table 2. Limitless™ Wireless Limit Switch and MICRO SWITCH™ Limit Switches

LIMITLESS™ WLGA/WLS Wireless Limit Switch	MICRO SWITCH™ HDLS Heavy-Duty Limit Switch	MICRO SWITCH™ GLS Global Limit Switch
		
Features and Benefits		
<ul style="list-style-type: none"> • Remotely monitors processes and equipment • Combines the best of MICRO SWITCH global limit switches with the latest commercial off-the-shelf wireless technology • Flexible - easy to reconfigure and network multiple switches • Easy installation, maintenance and operation with no wires – get up and running in minutes • Real-time valve status information • Communicates up to 1000 ft • Ultra-low power to prolong battery life • IP67 sealing 	<ul style="list-style-type: none"> • Rugged, heavy-duty switch with a die-cast, epoxy-coated body to withstand shock, vibration, washdowns and outdoor environments • Reliable, repeatable and accurate • Top plunger, top roller, top rotary, side rotary, side plunger, side rotary, wobble 	<ul style="list-style-type: none"> • Zinc die-cast or plastic body to withstand shock, vibration, washdowns and outdoor environments • GLC metal housings for better sealing and UV protection; GLD plastic housing for design versatility • UL, CSA, CE and CCC approvals • Side rotary, top plunger, top roller, wobble • Designed for worldwide applications and supported with sale/after sale service


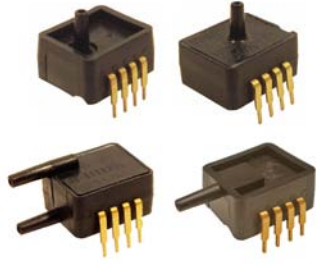
Sensors and Switches in Valve Actuators and Positioners

Table 3. Position Sensor, Stainless Steel Media Isolated Pressure Sensor and Pressure Switches

SMART Position Sensor SPS Series, 75 mm Linear	MLH Series Stainless Steel Media Isolated Pressure Sensor	Series III Pressure Switch	Series V Pressure Switch
			
Features and Benefits			
<ul style="list-style-type: none"> • Flexible, durable package for specified harsh environments • Reduces costs, increases standardization by 90%, eliminating multiple sensor and switch components • Patented combination of magnetoresistive and ASIC provides accuracy up to 0.05% of full-scale • On-board ASIC provides signal processing and communication with customers' integrated control units • Simple non-contact solution reduces wear and tear 	<ul style="list-style-type: none"> • Small package with high integration reduces the number of components needed to implement the sensor • Wide pressure range: 0 psi to 50 psi through 9 psi to 8000 psi allows for varied use within the application • Enhanced accuracy $\pm 0.25\%$ BFSL, $\pm 0.5\%$ BFSL below 100 psi allows for accurate pressure measurement of media, enhancing reliability of calculated flow rate • Allows user to monitor pressure within specified range and adjust as needed, enhancing flow rate efficacy • Wetted materials or media isolated packaging enhances resistance to contaminants or media, offering compatibility with many harsh environments • Customization that includes various pressure ranges, package styles (ports and connections), and calibrated options minimizes design-in effort • Products available throughout customer's product lifecycle, eliminating restarting design-in process, and requalifying or resubmitting for regulatory approval 	<ul style="list-style-type: none"> • Non-ferrous chamber • Excellent set-point integrity at extreme temperatures • Snap-action switch • Gold-plated contacts • Dead band • Low contact resistance • Wiping action • Fast transfer time • Adjustable differential • Thoroughly tested for shock and vibration resistance • Particularly valuable in applications where hysteresis, fast transfer time, and low contact resistance are vital 	<ul style="list-style-type: none"> • Set points up to 3000 psi • Snap action switch • Gold-plated contacts • Dead band • Water-dunk proof • Excellent set-point integrity at extreme temperatures • Wide fluid compatibility • Excellent response time • Incorporate where hysteresis, fast response time, and low contact resistance are vital

Sensors and Switches in Valve Actuators and Positioners

Table 4. Silicon Pressure Sensors

TruStability® Silicon Pressure Sensors HSC Series, SSC Series	ASDX Series Silicon Pressure Sensors
	
Features and Benefits	
<ul style="list-style-type: none"> • Industry-leading stability often eliminates the need for calibration after printed circuit board mount, and periodically over time • Calibrated, providing optimal accuracy • Multiple packaging, mounting, power and signal options, combined with customized calibration capabilities increase flexibility within the application • Small size typically allows for easy placement on crowded boards or in small devices • Excellent repeatability, high accuracy, and high reliability even under demanding conditions • Pressure range monitoring within the specified range, allowing adjustments to be made • Meets specified pressure level requirements, providing enhanced sensitivity and accuracy over the pressure range 	<ul style="list-style-type: none"> • Numerous output options: ratiometric 12-bit analog or 12-bit I²C or SPI digital; 3.3 Vdc or 5.0 Vdc supply voltage; standard calibrations: inches H₂O, cm H₂O, psi, mbar, bar, kPa; absolute, differential, gage pressure types for flexibility within application • Accurate pressure monitoring provide enhanced stability over time • Signal conditioned analog output allows for fast and easy integration into standard electronic circuits • Digital interface option allows for the convenience of direct interface to microprocessors and microcontrollers • Tight total error band provides enhanced sensitivity and accuracy, even at ultra-low pressure ranges • Enhanced quality and reliability in many demanding operations

Sensors and Switches in Valve Actuators and Positioners

WARNING

PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use

WARNING

MISUSE OF DOCUMENTATION

- The information presented in this application note is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

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