

Detecting and Monitoring Valves in Hazardous Areas

An Application Note

Background

Honeywell's Valve Position Indicator, VPX Series provides a safe, reliable and accurate way for detecting and monitoring the real-time open/closed status of valves in potentially hazardous areas for a variety of industrial applications.

Control valves are used in many industrial facilities and have a dominant role for controlling and regulating various chemical processes. They regulate the flow or pressure of fluids and gases within the required operating range. These valves provide a digital or analog electrical signal and sometimes provide a visual indication. The electrical signal is fed into a PLC/DCS Input/Output module which helps regulate industrial processes. Eighty percent of control valves require human intervention where a worker has to physically open or close a valve. In addition to the manual operating aspect of control valves, if these devices are located in potentially hazardous areas, then the liability of human intervention significantly increases.

Petrochemical plants, oil & gas refineries, textile dyeing & finishing plants & wastewater treatment facilities have numerous control valves. They are some of the industrial sectors which are categorized as hazardous areas due to the presence of high concentrations of flammable gases, vapors, liquids and combustible dusts in the surrounding atmosphere. Electrical or electronic products in hazardous areas must be certified as explosion proof or intrinsically safe to mitigate risk to workers and equipment.

Honeywell's Valve Position Indicator switches, VPX Series, are built especially for outdoor use in hazardous environments. The switch enclosure is classified as explosion proof and constructed to withstand the pressure of an internal explosion. Flame paths cool the exploding gases to a point less than the lowest safe operating temperature of the surrounding gas. The switches have standard rugged die-cast aluminum housings that are weather sealed and comply with NEMA 4X requirement for protection against corrosion, in addition to other NEMA sealing (NEMA 4, 6, and 13), that certify the VPX Series for rain, wind, snow, ice and blowing dust conditions.

Intrinsically Safe (IS) design ensures the safe operation of electrical or electronic equipment in potentially hazardous areas by using internal circuitry that is incapable of producing heat or electrical sparks sufficient enough to ignite an explosion prone atmosphere. The VPX Series



switches also come with versions equipped with the inductive proximity switches which has the Intrinsically Safe (IS) rating for Zone 0 applications.

Solution

Natural gas processing plants are one of the biggest hazardous industrial markets for control valves. These industrial facilities have a vast infrastructure of inter-connected pipelines that can run for hundreds of miles. These pipelines are responsible for transporting the natural gas to various stations within the facility for complex chemical processes such as refining, separation, extraction, liquefaction, and purification. These processing steps are necessary to transport the natural gas over long distances as well as for the recovery of other valuable gas components. Control valves play a major role during the operation of all of the afore-mentioned processing steps. These valves help to monitor, control, and regulate the various chemical processes.

In the Mining industry, control valves are used for many critical applications. They are used independently or in conjunction with a valve positioner/actuator to provide real-time open/closed status of valves from remote locations that are hard to get to, or where power isn't

readily available. The mining industry is probably one of those very few industrial sectors where all of the four hazards usually found in hazardous areas may be encountered, namely – flammable gases, vapors, liquids, and combustible dusts. Products and machineries that are used in the mining industry are subject to more wear due to the extreme harsh and corrosive environmental conditions created by acidic water and moisture, salt, minerals in both liquids and dust forms and chemicals. Some of the common mining applications that takes place above the mining surface are coal steam gas (CSG) production, transportation of CSG, mineral processing, smelting, and refining. There are also other mining applications underground that are going on in parallel such as pumping stations, dewatering (removal of groundwater), boiler feed, and discharge processes. All of these mining applications and processes requires precise control and monitoring of valves. Control valves help to keep the mining industry safe, efficient and economically feasible.

Table 1. VPX Agency Approvals

AGENCY	APPROVALS
CULUS LISTING	Class I, Div I, Groups B, C, D (Gas Ratings) Class II, Div I, Groups E, F, G (Dust Ratings)
ATEX/IEC EX CERTIFICATION	II 2 G, II 2 D (ATEX Ratings) Ex db IIC T6 Gb (Gas Ratings) Ex tb IIIC T85°C Db (Dust Ratings) Ta -40 °C to +50 °C (Switch Code 4A or 4B) Ta -40 °C to +60 °C (Switch Code 2A or 2B)
ATEX/IEC EX INTRINSICALLY SAFE RATINGS	II 1 G, II 1 GD (ATEX Ratings) Ex ia IIC T4 Ga (Gas Ratings) Ex ia IIIC 135°C Da (Dust Ratings) Ta -40°C to 80°C
SAFETY INTEGRATION LEVEL (SIL)	SIL 3 per IEC 61058-2 Mechanical endurance MCTF: 500,000 Electrical endurance MCTF proximity switches: 50,000 Electrical endurance MCTF electromechanical switches loaded at 16 A 250 Vac: 25,000 Electrical endurance MCTF electromechanical switches loaded at 0.5 A 250 Vdc: 10,000

*REFER TO INSTALLATION DRAWING OR CONTACT FACTORY FOR MORE INFORMATION ON CERTIFICATIONS AND APPROVALS

FEATURES & BENEFITS

- VPX Series switches are certified for cULus, ATEX, and IEC Ex specifications for global applications that require protection from explosive gases and dust. NEPSI and KOSHA approvals coming soon!
- Die-cast aluminum housing and various sealing (NEMA 4, 4X, 6, and 13), certifies the VPX Series is rated for rain, wind, snow, ice and blowing dust environments
- Versions with four electromechanical switches have an operating temperature of -40 °C to 50 °C [-40 °F to 122 °F]
- Versions with two electromechanical switches have an operating temperature of -40 °C to 60 °C [-40 °F to 140 °F]
- Premium versions with proximity switches have an operating temperature of -40 °C to 80 °C [-40 °F to 176 °F]
- VPX Series equipped with inductive proximity switches carry an Intrinsically Safe (IS) rating in addition to the various hazardous ratings
- Well suited for up to 500,000 actuation cycles
- Available in multiple indicator colors that are visible from all directions

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Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. 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 that Honeywell, in its sole discretion, 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 Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer's sole responsibility 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 writing. However, Honeywell assumes no responsibility for its use.

WARNING **IMPROPER INSTALLATION**

- Consult with local safety agencies and their requirements when designing a machine control link, interface and all control elements that affect safety.
- Strictly adhere to all installation instructions.

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

For more information

To learn more about Honeywell's sensing and switching products, call 1.800.537.6945, visit sensing.honeywell.com, or e-mail inquiries to info.sc@honeywell.com

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